NISSAN

R34

SUPPLEMENT-I

SERVICE MANUAL

NISSAN

MODEL R34 SERIES

QUICK REFERENCE INDEX

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FOREWORD

This Supplement contains information concerning necessary service procedures and relevant data for the model R34 face-lift.

All information, illustrations and specifications contained in this Supplement are based on the latest product information available at the time of publication. If your NISSAN model differs from the specifications contained in this Supplement, consult your NISSAN distributor for information.

The right is reserved to make changes in specifications and methods at any time without notice.

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HOW TO USE THIS MANUAL

- This Service Manual only contains the service data specifications and trouble diagnosis information such as self-diagnosis, CONSULT, circuit diagram and so on.

- For other information not specified in this manual, refer to the following service publications.
 - Pub. No. A006029 (Japanese version Service Manual for initial production model)
 - Pub. No. WD8E-0R34J0 (Wiring diagram manual for initial production model)
 - Pub. No. SM8E-0R34J0 (English version Service Manual for initial production model)
 - Pub. No. A006030 (Japanese version Service Manual for GTR model)
 - Pub. No. WD9E-R34AJ0 (Wiring diagram manual for GTR model)

IMPORTANT SAFETY NOTICE

The proper performance of service is essential for both the safety of the technician and the efficient functioning of the vehicle.
The service methods in this Service Manual are described in such a manner that the service may be performed safely and accurately.

Service varies with the procedures used, the skills of the technician and the tools and parts available. Accordingly, anyone using service procedures, tools or parts which are not specifically recommended by NISSAN must first be completely satisfied that neither personal safety nor the vehicle's safety will be jeopardized by the service method selected.

GENERAL INFORMATION

SECTION GI

MODIFICATION NOTICE:
GT-R model has been introduced.

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CONSULT CHECKING SYSTEM 2
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Function and System Application

Diagnostic test mode	Function	ENGINE	Air bag	ABS	NATS
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on CONSULT.	×	—	—	—
Self-diagnostic results	Self-diagnostic results can be read and erased quickly.	×	×	×	×
Trouble diagnostic record	Current self-diagnostic results and all trouble diagnostic records previously stored can be read.	—	×	—	—
ECU discriminated No.	Classification number of a replacement ECU can be read to prevent an incorrect ECU from being installed.	—	×	—	—
Data monitor	Input/Output data in the ECM can be read.	×	—	×	—
Active test	Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECMs and also shifts some parameters in a specified range.	×	—	×	—
ECM part number	ECM part number can be read.	×	—	×	—
Function test	Conducted by CONSULT instead of a technician to determine whether each system is "OK" or "NG".	×	—	—	—
Control unit initialization	All registered ignition key IDs in NATS components can be initialized and new IDs can be registered.	—	—	—	×
Self-function check	ECM checks its own NATS communication interface.	—	—	—	×

×: Applicable

Lithium Battery Replacement

CONSULT contains a lithium battery. When replacing the battery obey the following:

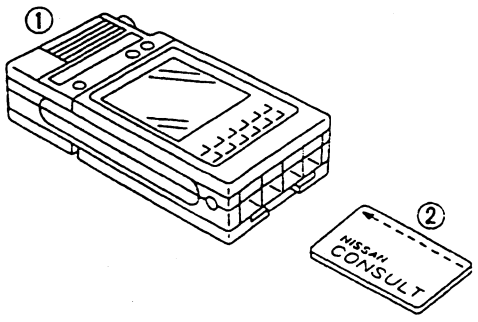
WARNING:

Replace the lithium battery with SANYO Electric Co., Ltd., CR2032 only. Use of another battery may present a risk of fire or explosion. The battery may present a fire or chemical burn hazard if mistreated. Do not recharge, disassemble or dispose of in fire.

Keep the battery out of reach of children and discard used battery conforming to the local regulations.

Checking Equipment

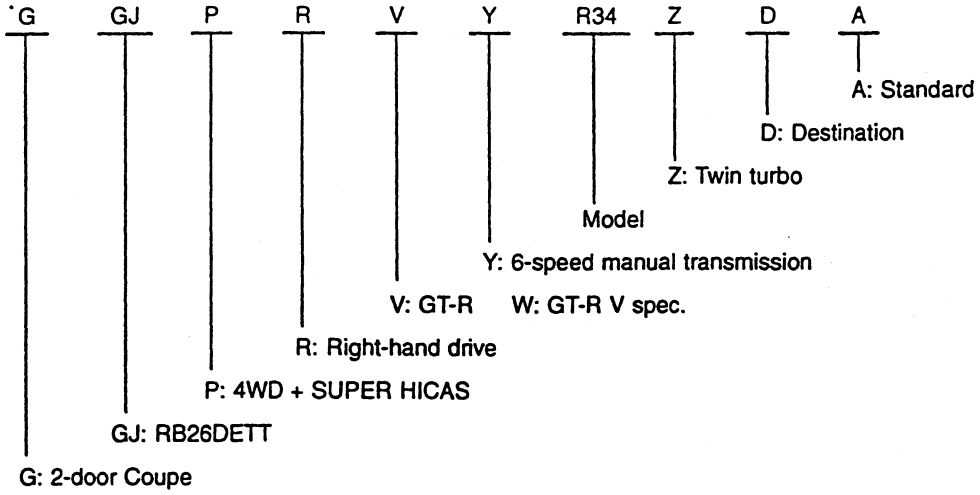
When ordering the below equipment, contact your NISSAN distributor.

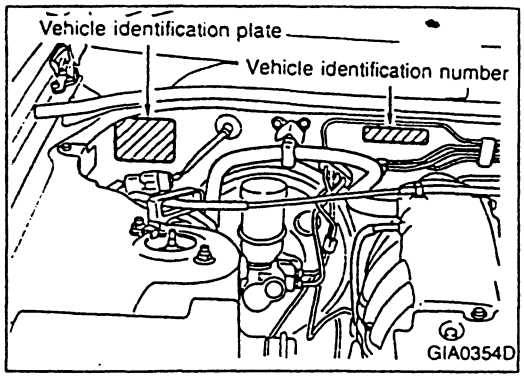
Tool name	Description
NISSAN CONSULT ① CONSULT unit and accessories ② Program card EE980 and NATS-E940 (For NATS)	 NT004

Model Variation

Body	Grade	Model (RH drive)	Engine	Transmission	Rear differential carrier
2-door	GT-R	GGJPRVYR34ZDA	RB26DETT	ETX13A	R200H
		GGJPRWYR34ZDA			R200Z

Prefix and suffix designations:

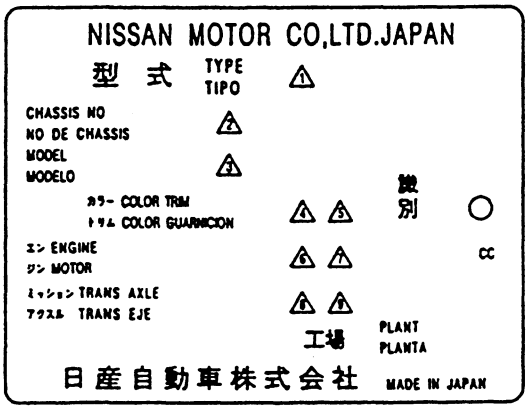




Vehicle Identification Number

The stamping position for vehicle identification number is at the right side of cowl top panel.
GF-BNR34: From BNR34-000001

Vehicle Identification Plate



1. Type
2. Chassis No.
3. Model
4. Body color
5. Inner trim color
6. Engine type
7. Displacement
8. Transmission type
9. Transaxle type

GIA0018D

ENGINE CONTROL SYSTEM

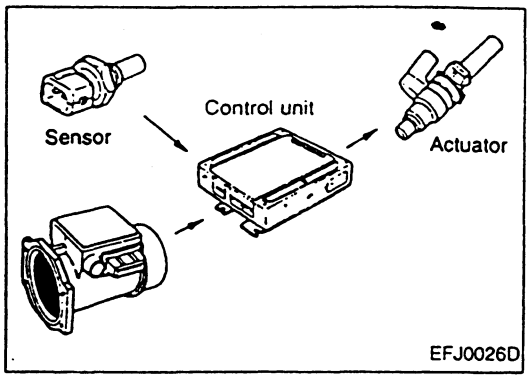
SECTION EC

MODIFICATION NOTICE:

- RB26DETT engine has been added.

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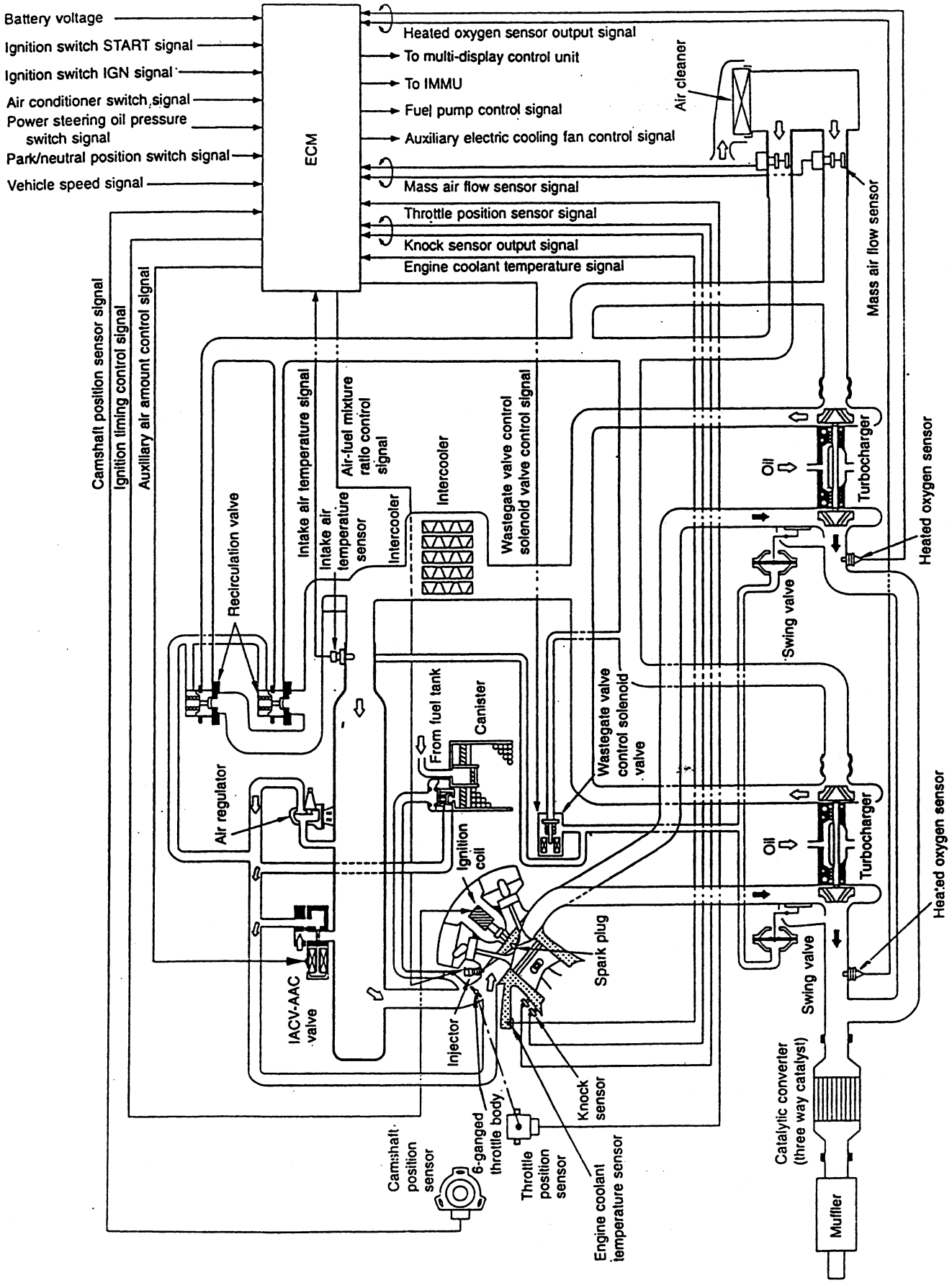
System Description

The engine control system, which performs various controls such as the fuel injection control, ignition timing control and idle speed with a single control unit, has been adopted.
The engine immobilizer system (anti-theft device) has been adopted.
Diagnostic system applicable to CONSULT has been adopted for easier inspection, service, and trouble diagnostic operations.

Description of Engine Control

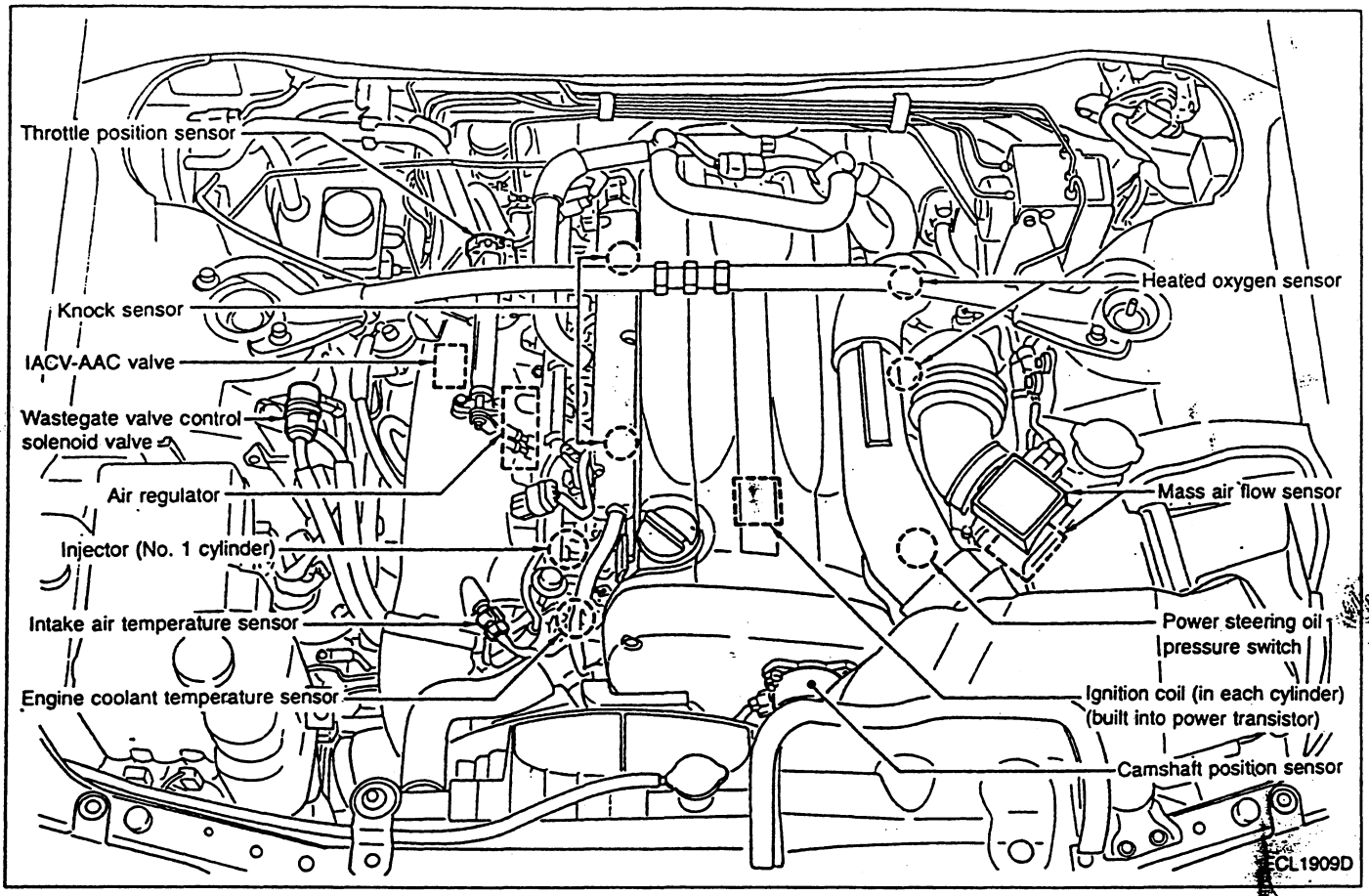
Item	Description
Fuel injection control	• Performs optimum fuel injection for every operation condition for improved exhaust performance and response. • Adopts air/fuel ratio feedback learning control that performs compensation of air/fuel ratio for improved drivability when the system is in a transitional condition due to sudden change in air/fuel ratio.
Ignition timing control	• Uses an ignition timing map stored in the control unit to perform controls so that the optimum ignition timing is obtained for every operating condition. • Performs knock control, in which the ignition timing is advanced/retarded according to the presence of knocking, so that the optimum ignition timing is obtained for every operating condition and type of fuel. • Each cylinder has a built-in ignition coil equipped with a power transistor. This provides the highest possible reliability.
Idle speed control	• Performs feedback control to obtain the target idle speed for various conditions, such as during warm-up or when the air conditioner is actuated, via the AAC valve that adjusts the intake air amount when the throttle valve is fully closed.
Fuel pump drive control	• Turns the fuel pump relay ON/OFF according to the engine speed signal. • FPCM (Fuel Pump Control Modulator) control has been adopted for reduced idle noise.
Heated oxygen sensor heater control	• Promotes warm-up of the heated oxygen sensor for improved air/fuel ratio feedback function.
Air conditioner cut control	• Turns the air conditioner relay OFF at starting or during acceleration to reduce the engine load.
Auxiliary electric fan control	• Turns the auxiliary electric fan relay ON/OFF according to the engine coolant temperature signal.
Turbo pressure control	• Wastegate valve control solenoid valve (duty control) operation in response to existing driving conditions.
Engine immobilizer	• Prevents engine starting in response to data received from IMMU.
Fail-safe and backup controls	• Ensures the vehicle's safe operation and enables the vehicle to be driven in an emergency when any of the system major components (microcomputer in the control unit, engine coolant temperature sensor, etc.) fails.
Diagnostic system	• For easier trouble diagnosis, self-diagnostic system is adopted and the existing diagnostic system is modified so that CONSULT can be used.

System Diagram



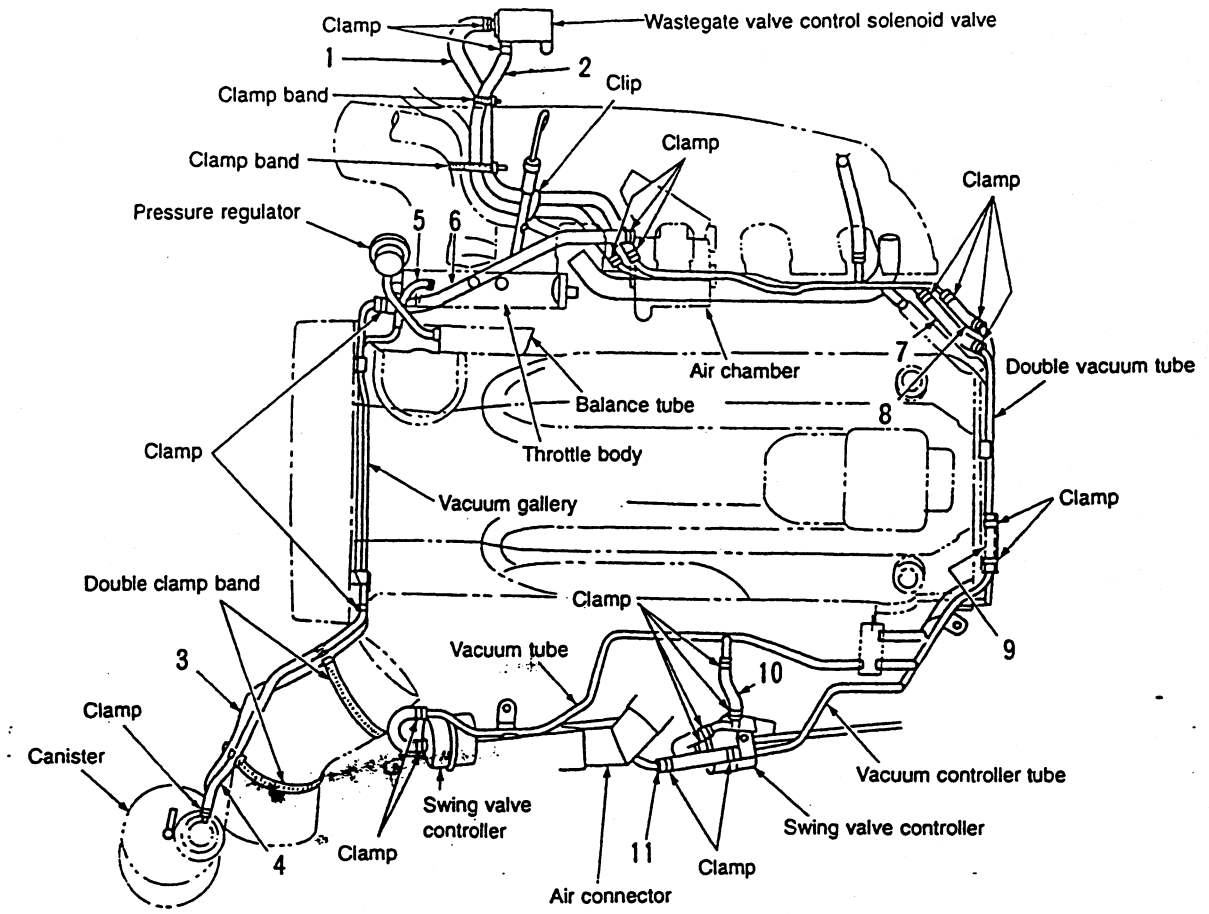
ECL1908D

Component Parts Location



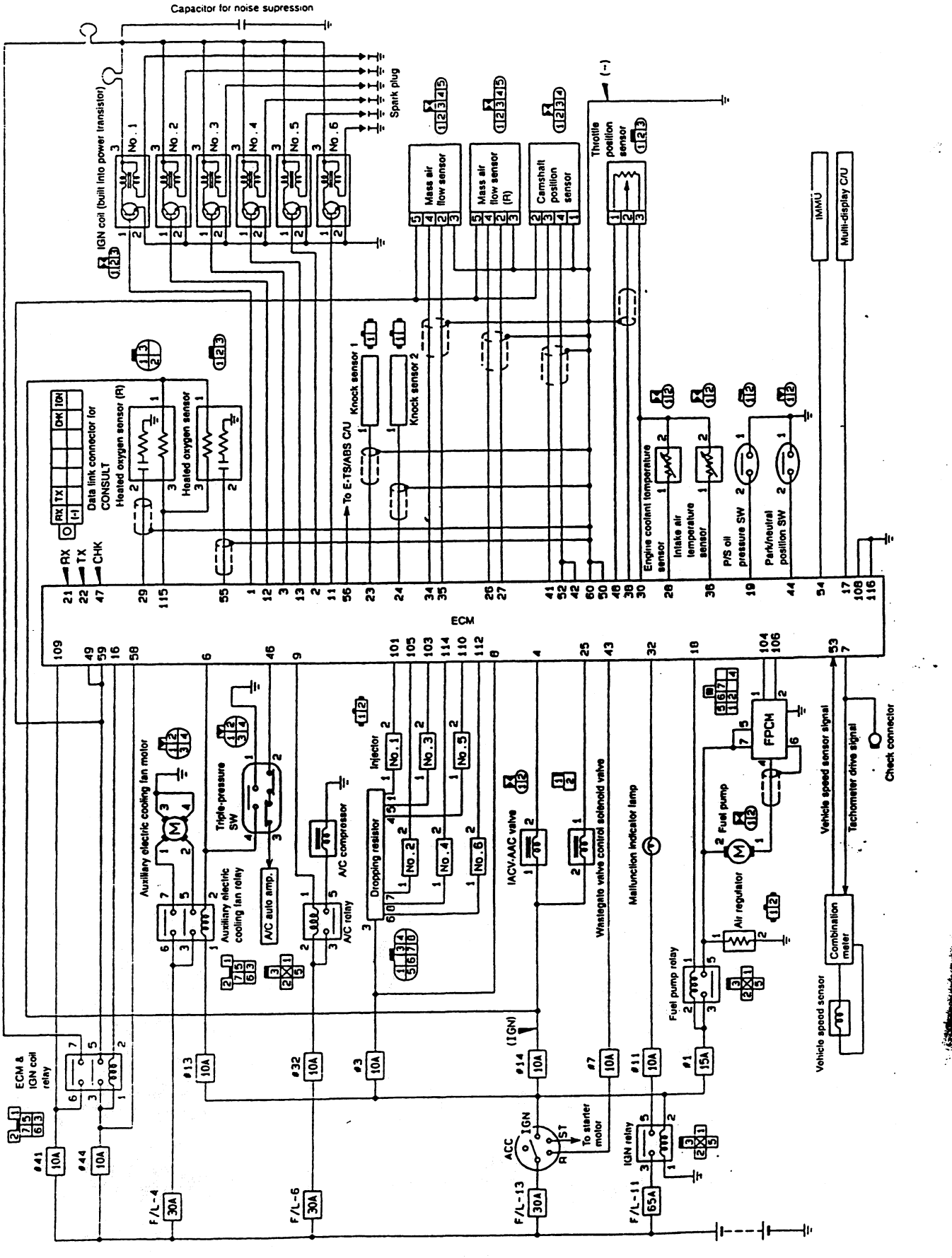
	Component name	Type	Location
Actuators	Fuel injector	Top feed	At intake manifold
	Fuel pump	Roller vane	Inside fuel tank
	IACV-AAC valve	Solenoid valve (duty control)	Below intake manifold collector
	Air regulator	Bimetal	On intake manifold lower side
	Ignition coil	Micro-mold (Built-into power transistor)	Cylinder head (Top of each spark plug)
	Wastegate valve control solenoid valve	Solenoid valve (Duty control)	Strut tower side, right side
Sensors	Camshaft position sensor	Photoelectric (Directly driven by camshaft)	Left front of cylinder head
	Mass air flow sensor	Hot-wire	Air cleaner
	Throttle position sensor	Variable resistance	Accelerator work unit
	Engine coolant temperature sensor	Thermistor	Water outlet
	Intake air temperature sensor		Intake manifold collector
	Heated oxygen sensor	Zirconia (with heater)	Turbocharger exhaust outlet
	Knock sensor	Piezoelectric	Right side of cylinder block
	Power steering oil pressure switch	ON-OFF switch	Left side of engine oil pan
	Vehicle speed sensor	Electromagnetic power generation	Transfer
ECM		76-pin digital control	Passenger dashboard side
Fuel pump control modulator (FPCM)		Voltage-control	Front upper side of trunk room
ECM & IGN coil relay		Small universal relay (2M)	Behind ECM (passenger dashboard side)

Vacuum Hose Drawing



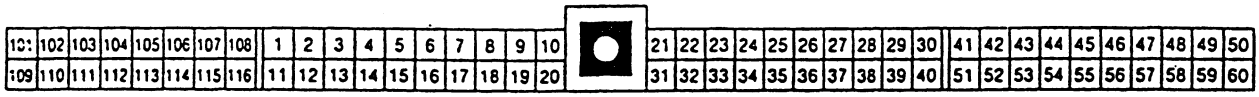
1. Wastegate valve control solenoid valve to Vacuum gallery
2. Wastegate valve control solenoid valve to Vacuum gallery
3. Canister to Vacuum gallery
4. Canister to Vacuum gallery
5. Throttle chamber to Vacuum gallery
6. Air chamber to Vacuum gallery
7. Vacuum gallery to Vacuum gallery
8. Vacuum gallery to Vacuum gallery
9. Vacuum gallery to Vacuum gallery
10. Vacuum gallery to Vacuum gallery
11. Vacuum gallery to Vacuum controller tube

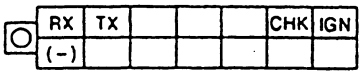
Circuit Diagram



ECL1910D

ECM Terminal Layout





(Data link connector for CONSULT)

ECQ1587D

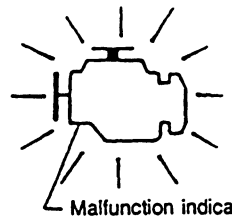
Terminal No.	Description	Terminal No.	Description
1	Ignition signal (power transistor drive signal) (No. 1 cylinder)	31	—
2	Ignition signal (power transistor drive signal) (No. 5 cylinder)	32	Malfunction indicator lamp
3	Ignition signal (power transistor drive signal) (No. 3 cylinder)	33	—
4	IACV-AAC valve control signal	34	Mass air flow sensor ground (No. 1 - 3 cylinders)
5	—	35	Mass air flow sensor signal (No. 1 - 3 cylinders)
6	Auxiliary electric cooling fan relay control signal	36	Intake air temperature sensor signal
7	Tachometer drive signal	37	—
8 (IGN)	Ignition switch (IGN) signal	38	Throttle position sensor signal
9	Air conditioner relay control signal	39	—
10	—	40	—
11	Ignition signal (power transistor drive signal) (No. 6 cylinder)	41	Camshaft position sensor 1° (POS) signal
12	Ignition signal (power transistor drive signal) (No. 2 cylinder)	42	Camshaft position sensor 120° (REF) signal
13	Ignition signal (power transistor drive signal) (No. 4 cylinder)	43	Ignition switch (START) signal
14	—	44	Park/Neutral position switch signal
15	—	45	—
16	ECM & IGN coil relay control signal	46	Air conditioner switch signal
17	Injection pulse monitor (Ti monitor) signal	47 (CHK)	Check (Diagnosis start)
18	Fuel pump relay control signal	48	Throttle position sensor power supply
19	Power steering oil pressure switch signal	49	Control unit power supply
20	—	50 (-)	Control unit ground
21 (RX)	Receive (Data input to control unit)	51	—
22 (TX)	Transmit (Data output from control unit)	52	Camshaft position sensor 120° (REF) signal
23	Knock sensor signal 1	53	Vehicle speed sensor signal
24	Knock sensor signal 2	54	IMMU
25	Wastegate valve control solenoid valve control signal	55	Heated oxygen sensor signal (No. 4 - 6 cylinders)
26	Mass air flow sensor ground (R) (No. 4 - 6 cylinders)	56	Throttle opening signal (to E-TS/ABS control unit)
27	Mass air flow sensor signal (R) (No. 4 - 6 cylinders)	57	—
28	Engine coolant temperature sensor signal	58	Battery power supply
29	Heated oxygen sensor signal (R) (No. 1 - 3 cylinders)	59	Control unit power supply
30	Sensor ground	60 (-)	Control unit ground
101	Injector No. 1 cylinder drive signal	109	Back electromotive current feedback circuit
102	—	110	Injector No. 5 cylinder drive signal
103	Injector No. 3 cylinder drive signal	111	—
104	Fuel pump terminal voltage control output signal (FPCM) 1	112	Injector No. 6 cylinder drive signal
105	Injector No. 2 cylinder drive signal	113	—
106	Fuel pump terminal voltage control output signal (FPCM) 2	114	Injector No. 4 cylinder drive signal
107	—	115	Heated oxygen sensor heater control signal
108	Injector ground	116	Injector ground

Symbols in () next to terminal numbers indicate the data link connector terminals.

Fail-Safe and Backup Functions

- The fail-safe function estimates the opening conditions with other input signals and selects safer conditions for the engine (vehicle) control, based on the data previously stored in the control unit, when any of the critical sensors in the ECM fails.
- The backup function allows the vehicle to be driven, using control signals previously stored in the control unit, even if the critical part of the system fails.

Function	Related sensor	Malfunction	Fail-safe/backup	MIL indication
Backup	ECM	The microcomputer in the control unit (CPU) is malfunctioning.	Fixes the ignition timing, fuel injection pulse width, and IACV-AAC valve opening to the preset values so that the vehicle can be driven.	MIL lights up.
Fail-safe function	Mass air flow sensor	Output voltage dropped below 0.28V while the engine is running.	Selects the fuel injection pulse width according to the engine speed and the throttle opening so that the vehicle can be driven. Fuel injection will be inhibited when the engine speed exceeded approx. 2,400 rpm. During fail-safe control, idle speed is controlled to 1,200 rpm.	—
	Engine coolant temperature sensor	Same as malfunction indication conditions. (Refer to EC-11.)	Uses the estimated engine coolant temperature (varies with elapsed time after start) to perform controls so that the vehicle can be driven normally. Under these conditions, the auxiliary electric cooling fan will operate in tandem with the air conditioner switch.	MIL lights up.
	Intake air temperature sensor		Engine control in response to the estimated intake air temperature.	—
	Knock sensor		Judges the vehicle as of regular specification. Retards the ignition timing within the knocking range so that the vehicle can be driven normally.	—
	Throttle position sensor		Determines idle position according to the base fuel schedule and the engine speed. Fixes the output to the preset value so that the vehicle can be driven normally.	—



ECO0090D

Self-diagnosis

MALFUNCTION INDICATOR LAMP (MIL) INDICATION

Diagnostic test mode I — BULB CHECK

The malfunction indicator lamp should come ON when the ignition switch is turned ON (engine not started), and go OFF when the engine is started.

Diagnostic test mode I — MALFUNCTION WARNING

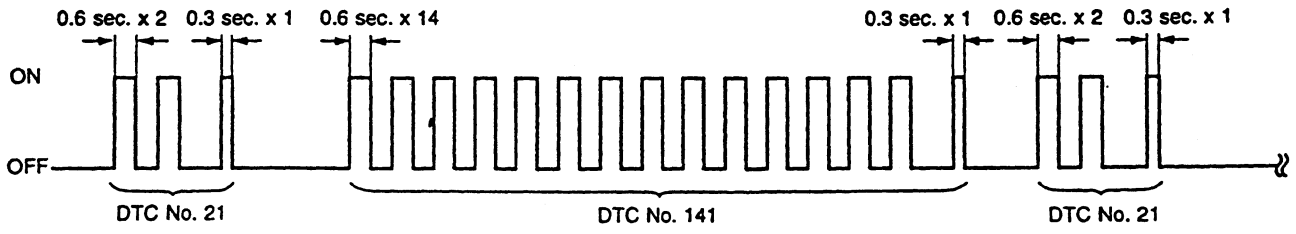
The system goes into the malfunction warning mode when any of the following conditions is satisfied, and warns the driver by lighting up the malfunction indicator lamp in the combination meter.

- Microcomputer (CPU) in the ECM is malfunctioning.
- Malfunction is detected during engine coolant temperature sensor circuit self-diagnosis.
- Malfunction is detected during overheat self-diagnosis.

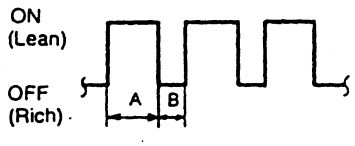
Diagnostic test mode II — SELF-DIAGNOSTIC RESULTS

Nissan Anti-Theft System code number consists of a 3-digit numeral. For example, when it is "141", a long flash on-off cycle (14 times) and a short flash on-off cycle (1 time) appear on display.

Example: Blinking pattern for DTC No. 21 and 141



ECL1935D



Duty ratio in 1 cycle { Lean: A/(A + B) x 100 / Rich: B/(A + B) x 100

EFJ0041D

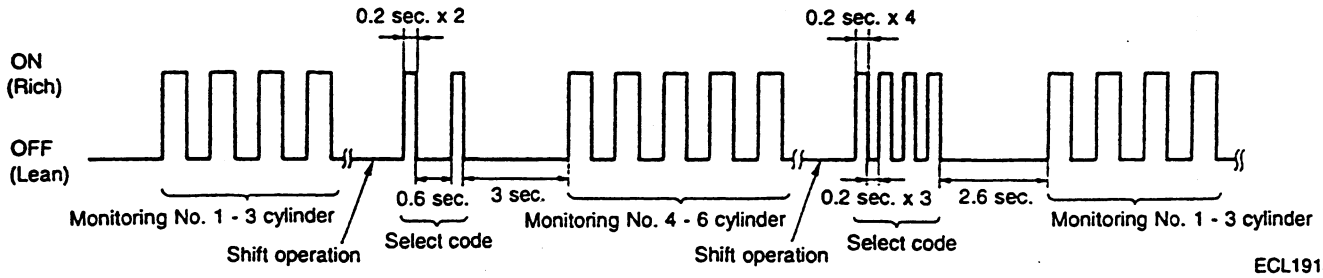
Diagnostic test mode II — HEATED OXYGEN SENSOR MONITOR

- This mode indicates status of the air/fuel ratio by blinks of the malfunction indicator lamp.
- Warm up the engine and increase and maintain the engine speed at 2,000 rpm. Check that the malfunction indicator lamp blinks at least five times in 10 seconds. (Air-fuel mixture ratio feedback control is clamped during idling.)

Self-diagnosis (Cont'd)

- During air/fuel ratio feedback control,
 when heated oxygen sensor output is high (rich): MIL goes OFF.
 when heated oxygen sensor output is low (lean): MIL comes ON.
- When air/fuel ratio feedback control is clamped: Status just before clamp is maintained.
- When air/fuel ratio feedback control is stopped: MIL goes OFF.
- Heated oxygen sensor monitor is initially set in No. 1 through No. 3 cylinder monitoring mode. If monitoring No. 4 through No. 6 cylinder is needed, short diagnosis connector CHK terminal and IGN terminal using a wire lead for at least 2 seconds, then remove wire lead from both terminals. A select code then flashes on and off, setting heated oxygen sensor monitor in No. 4 through No. 6 monitoring mode. Repeat above operations to shift heated oxygen sensor monitor from one mode to the other.

Heated oxygen sensor monitor



Self-diagnosis (Cont'd)

SELF-DIAGNOSTIC INDICATION ITEMS

DTC No.	Self-diagnostic test items	Malfunction (DTC No.) indication conditions (Malfunction is detected when ...)	MIL indication
11	Camshaft position sensor signal circuit	• 1° (POS) signal or 120° (REF) signal is not input for predetermined time while the engine is running. • Signal sometimes misses. (Abnormal correlation is detected between 1° (POS) signal and 120° (REF) signal.)	—
12	Mass air flow sensor signal circuit	• Mass air flow sensor output voltage is 2.0V or greater for predetermined time when ignition switch is turned from OFF to ON, or after the engine is stalled. • Mass air flow sensor output voltage is less than 0.28V for predetermined time while the engine is running.	MIL lights up.
13	Engine coolant temperature sensor signal circuit	• Engine coolant temperature sensor output voltage is approx. 4.8V or greater (open circuit) or less than 0.04V (short circuit) for predetermined time.	MIL lights up.
21	Ignition signal circuit	• No consecutive ignition signal while the engine is running.	—
28	Overheat	• Engine coolant temperature sensor output voltage is approx. 0.35V or less (sensor normal) for predetermined time.	MIL lights up.
34	Knock sensor signal circuit	• At least one knock sensor indicates the output voltage of approx. 4V or greater (open circuit) or less than approx. 1V (short circuit).	—
41	Intake air temperature sensor signal circuit	• Intake air temperature sensor continuously emits an output voltage of more than approx. 4.8V (open circuit) or less than 0.04V (short-circuit) for a certain period of time.	—
43	Throttle position sensor signal circuit	• Throttle position sensor output voltage is approx. 4.7V or greater (open circuit) or less than 0.04V (short circuit) for predetermined time.	MIL lights up.
55	No malfunction	• No malfunction is detected in all the above circuits.	—
141	Nissan Anti-Theft System	• Lock mode in progress	—
142		• Start permission code	
143		• Communication between ECM and IMMU is faulty.	
144		• Communication between ECM and IMMU is faulty.	
145		• Communication between IMMU and key is faulty or key itself is faulty.	
146		• New or different key is used.	
147		• EEP ROM built into ECM is faulty.	
148		• EEP ROM built into IMMU is faulty.	

If any one of the codes 141 through 148 appear on display, the display shows only "NATS MALFUNCTION" as a self-diagnostic result.

CONDITIONS TO TURN OFF MALFUNCTION INDICATOR LAMP

After cause of the problem has been eliminated from ignition signal system, turn ignition switch OFF.
Overheat: Check for causes of overheat, then erase self-diagnostic results.
Other items: Malfunction indicator lamp turns OFF when the vehicle returned to normal condition.

HOW TO ERASE SELF-DIAGNOSTIC RESULTS

In Diagnostic Test Mode II, with the engine stopped (ignition switch ON), connect terminals "CHK" and "IGN" on the data link connector for 2 or more seconds with a suitable harness, then disconnect them.

CONSULT

SELF-DIAGNOSTIC RESULTS MODE

When any of the control unit input/output signal circuits fails and the self-diagnostic malfunction detection conditions are satisfied, the malfunctioning circuit is stored in the memory and displayed later.

Self-diagnostic test items	Malfunction is detected when ...	Malfunction display item
Camshaft position sensor signal circuit	• 1° (POS) signal or 120° (REF) signal is not input for predetermined time while the engine is running. • Abnormal correlation is detected between 1° (POS) signal and 120° (REF) signal.	CAMSHAFT POSI SEN
Mass air flow sensor signal circuit	• Mass air flow sensor output voltage is 2.0V or greater for predetermined time when ignition switch is turned from OFF to ON, or after the engine is stalled. • Mass air flow sensor output voltage is less than 0.28V for predetermined time while the engine is running.	MASS AIR FLOW SEN
Engine coolant temperature sensor signal circuit	• Engine coolant temperature sensor output voltage is approx. 4.8V or greater (open circuit) or less than 0.04V (short circuit) for predetermined time.	COOLANT TEMP SEN
Ignition signal circuit	• No consecutive ignition signal while the engine is running.	IGN SIGNAL-PRIMARY
Overheat	• Engine coolant temperature sensor output voltage is approx. 0.35V or less (sensor normal) for predetermined time.	OVER HEAT
Knock sensor signal circuit	• At least one knock sensor indicates the output voltage of approx. 4V or greater (open circuit) or less than approx. 1V (short circuit).	KNOCK SENSOR
Intake air temperature sensor signal circuit	• Intake air temperature sensor continuously emits an output voltage of more than approx. 4.8V (open circuit) or less than 0.04V (short-circuit) for a certain period of time.	INT AIR TEMP SEN
Throttle position sensor signal circuit	• Throttle position sensor output voltage is approx. 4.8V or greater (open circuit) or 0.04V or less (short circuit) for predetermined time.	THROTTLE POSI SEN
No malfunction	• No malfunction is detected in all the above circuits.	NO SELF DIAGNOSTIC FAILURE INDICATED. FURTHER TESTING MAY BE REQUIRED.
Nissan Anti-Theft System	• Lock mode in progress	NATS MALFUNCTION
	• Start permission code	
	• Communication between ECM and IMMU is faulty.	
	• Communication between ECM and IMMU is faulty.	
	• Communication between IMMU and key is faulty or key itself is faulty.	
	• New or different key is used.	
	• EEP ROM built into ECM is faulty.	
	• EEP ROM built into IMMU is faulty.	

When malfunctions related to the Nissan Anti-theft System are detected, the CONSULT display shows only "NATS MALFUNCTION" as a self-diagnostic result. When doing trouble diagnoses, use a CONSULT program card for NATS. (Refer to EL section.)

DATA MONITOR MODE

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
CMPS·RPM (POS) [rpm]	○	○	• Indicates the engine speed computed from the POS signal (1° signal) of the camshaft position sensor.	
MAS AIR/FL SE [V]	○	○	• The signal voltage of the mass air flow sensor is displayed.	• When the engine is stopped, a certain value is indicated.
MAS A/FL SE-R [V]	○			
COOLAN TEMP/S [°C] or [°F]	○	○	• The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	• When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
O2 SEN [V]	○	○	• The signal voltage of the oxygen sensor is displayed.	
O2 SEN-R [V]	○			
M/R F/C MNT [RICH/LEAN]	○	○	• Display of oxygen sensor signal during air-fuel ratio feedback control: RICH ... means the mixture became "rich", and control is being affected toward a leaner mixture. LEAN ... means the mixture became "lean", and control is being affected toward a rich mixture.	• After turning ON the ignition switch, "RICH" is displayed until air-fuel mixture ratio feedback control begins. • When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
M/R F/C MNT-R [RICH/LEAN]	○	○		
VHCL SPEED SE [km/h] or [mph]	○	○	• The vehicle speed computed from the vehicle speed sensor signal is displayed.	
BATTERY VOLT [V]	○	○	• The power supply voltage of ECM is displayed.	
THRTL POS SEN [V]	○	○	• The throttle position sensor signal voltage is displayed.	
INT/A TEMP SE [°C] or [°F]	○		• The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated.	
START SIGNAL [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the starter signal.	• After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL/POSI [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the throttle position sensor signal.	
AIR COND SIG [ON/OFF]	○	○	• Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the park/neutral position switch signal.	
PW/ST SIGNAL [ON/OFF]	○	○	• [ON/OFF] condition of the power steering oil pressure switch determined by the power steering oil pressure signal is indicated.	

NOTE:
Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

CONSULT (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
INJ PULSE [msec]		○	• Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	• When the engine is stopped, a certain computed value is indicated.
INJ PULSE-R [msec]				
IGN TIMING [BTDC]		○	• Indicates the ignition timing computed by ECM according to the input signals.	• When the engine is stopped, a certain value is indicated.
IACV-AAC/V [%]		○	• Indicates IACV-AAC/V control value computed by ECM according to the input signals.	
W/G CONT S/V [%]		○	• Indicates the wastegate valve control solenoid valve computed by ECM according to the input signals.	
PURG VOL C/V [ON/OFF duty]		○	• Indicates the EVAP canister purge volume control valve computed by the ECM according to the input signals. • The opening becomes larger as the value increases.	
A/F ALPHA [%]		○	• The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	• When the engine is stopped, a certain value is indicated. • This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-R [%]				
AIR COND RELY [ON/OFF]		○	• The air conditioner relay control condition (determined by ECM according to the input signal) is indicated.	
FUEL PUMP RELY [ON/OFF]		○	• Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
COOLING FAN [ON/OFF]		○	• The control condition of the cooling fan (determined by ECM according to the input signal) is indicated. ON ... Operating OFF ... Stop	
W/G CONT S/V [ON/OFF]			• Indicates [ON/OFF] condition of the wastegate valve control solenoid valve determined by ECM according to the input signals. ON ... High turbocharger pressure OFF ... Low turbocharger pressure	
VOLTAGE [V]			• Voltage measured by the voltage probe.	
PULSE [msec] or [Hz] or [%]			• Pulse width, frequency or duty cycle measured by the pulse probe.	• Only "#" is displayed if item is unable to be measured. • Figures with "#"s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.

CONSULT (Cont'd)

ACTIVE TEST MODE

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	• Engine: Return to the original trouble condition • Change the amount of fuel injection using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connector • Fuel injectors • Oxygen sensor
IACV-AAC/V OPENING	• Engine: After warming up, idle the engine. • Change the IACV-AAC valve opening percent using CONSULT.	Engine speed changes according to the opening percent.	• Harness and connector • IACV-AAC valve
ENG COOLANT TEMP	• Engine: Return to the original trouble condition • Change the engine coolant temperature using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connector • Engine coolant temperature sensor • Fuel injectors
IGNITION TIMING	• Engine: Return to the original trouble condition • Timing light: Set • Retard the ignition timing using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	• Adjust ignition timing (by moving camshaft position sensor)
POWER BALANCE	• Engine: After warming up, idle the engine. • A/C switch "OFF" • Shift lever "N" • Cut off each injector signal one at a time using CONSULT.	Engine runs rough or dies.	• Harness and connector • Compression • Injectors • Ignition coil with power transistor • Spark plugs
COOLING FAN	• Ignition switch: ON • Turn the cooling fan "ON" and "OFF" using CONSULT.	Cooling fan moves and stops.	• Harness and connector • Cooling fan motor • Cooling fan relay
FUEL PUMP RELAY	• Ignition switch: ON (Engine stopped) • Turn the fuel pump relay "ON" and "OFF" using CONSULT and listen to operating sound.	Fuel pump relay makes the operating sound.	• Harness and connector • Fuel pump relay
SELF-LEARNING CONT	• In this test, the coefficient of self-learning control mixture ratio returns to the original coefficient by touching "CLEAR" on the screen.		
TURBOCHARGE PRES	• Engine: Return to the original trouble condition • Change the wastegate valve control solenoid valve opening percent using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connector • Wastegate valve control solenoid valve • Vacuum hose

CONSULT (Cont'd)

FUNCTION TEST MODE

FUNCTION TEST ITEM	CONDITION	JUDGEMENT		CHECK ITEM (REMEDY)
SELF-DIAG RESULTS	• Ignition switch: ON (Engine stopped) • Displays the results of on board diagnostic system.	—		Objective system
CLOSED THROTTLE POSI	• Ignition switch: ON (Engine stopped) • Throttle position sensor circuit is tested when throttle is opened and closed fully. ("IDLE POSITION" is the test item name for the vehicles in which idle is selected by throttle position sensor.)	Throttle valve: opened	OFF	• Harness and connector • Throttle position sensor (Closed throttle position) • Throttle position sensor (Closed throttle position) adjustment • Throttle linkage • Verify operation in DATA MONITOR mode.
		Throttle valve: closed	ON	
THROTTLE POSI SEN CKT	• Ignition switch: ON (Engine stopped) • Throttle position sensor circuit is tested when throttle is opened and closed fully.	Range (Throttle valve fully opened — Throttle valve fully closed)	More than 3.0V	• Harness and connector • Throttle position sensor • Throttle position sensor adjustment • Throttle linkage • Verify operation in DATA MONITOR mode.
PARK/NEUT POSI SW CKT	• Ignition switch: ON (Engine stopped) • Neutral position switch circuit is tested when shift lever is manipulated.	Out of N/P positions	OFF	• Harness and connector • Neutral position switch • Linkage adjustment
		In N/P positions	ON	
FUEL PUMP CIRCUIT	• Ignition switch: ON (Engine stopped) • Fuel pump circuit is tested by checking the pulsation in fuel pressure when fuel tube is pinched.	There is pressure pulsation on the fuel feed hose.		• Harness and connector • Fuel pump • Fuel pump relay • Fuel filter clogging • Fuel level
COOLING FAN CIRCUIT	• Ignition switch: ON (Engine stopped) • Cooling fan circuit is tested when cooling fan is rotated.	The cooling fan rotates and stops every 3 seconds.		• Harness and connector • Cooling fan motor • Cooling fan relay
START SIGNAL CIRCUIT	• Ignition switch: ON → START • Start signal circuit is tested when engine is started by operating the starter. Battery voltage and water temperature before cranking, and average battery voltage, mass air flow sensor output voltage and cranking speed during cranking are displayed.	Start signal: OFF → ON		• Harness and connector • Ignition switch

CONSULT (Cont'd)

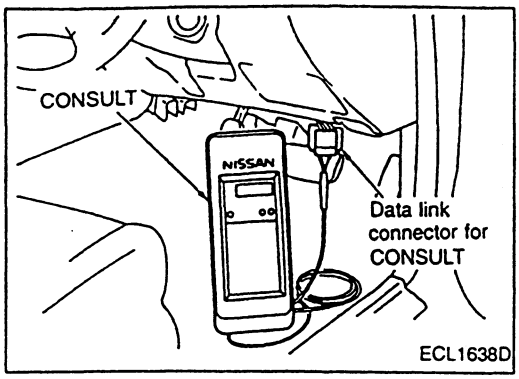
FUNCTION TEST ITEM	CONDITION	JUDGEMENT		CHECK ITEM (REMEDY)
PW/ST SIGNAL CIRCUIT	• Ignition switch: ON (Engine running) • Power steering oil pressure switch circuit is tested when steering wheel is rotated fully and then set to a straight line running position.	Locked position	ON	• Harness and connector • Power steering oil pressure switch • Power steering oil pump
		Neutral position	OFF	
VEHICLE SPEED SEN CKT	• Vehicle speed sensor circuit is tested when vehicle is running at a speed of 10 km/h (6 MPH) or higher.	Vehicle speed sensor input signal is greater than 4 km/h (2 MPH).		• Harness and connector • Vehicle speed sensor • Speedometer
IGN TIMING ADJ	• After warming up, idle the engine. • Ignition timing is checked by reading ignition timing with a timing light and checking whether it agrees with specifications.	The timing light indicates the same value on the screen.		• Adjust ignition timing (by moving camshaft position sensor or distributor) • Camshaft position sensor drive mechanism
MIXTURE RATIO TEST	• Air-fuel ratio feedback circuit (injection system, ignition system, vacuum system, etc.) is tested by examining the oxygen sensor output at 2,000 rpm under non-loaded state.	Oxygen sensor COUNT: More than 5 times during 10 seconds		• INJECTION SYS (Injector, fuel pressure regulator, harness or connector) • IGNITION SYS (Spark plug, ignition coil, power transistor harness or connector) • VACUUM SYS (Intake air leaks) • Oxygen sensor circuit • Oxygen sensor operation • Fuel pressure high or low • Mass air flow sensor
POWER BALANCE	• After warming up, idle the engine. • Injector operation of each cylinder is stopped one after another, and resultant change in engine rotation is examined to evaluate combustion of each cylinder. (This is only displayed for models where a sequential multiport fuel injection system is used.)	Difference in engine speed is greater than 25 rpm before and after cutting off the injector of each cylinder.		• Injector circuit (Injector, harness or connector) • Ignition circuit (Spark plug, ignition coil, power transistor harness or connector) • Compression • Valve timing
IACV-AAC/V SYSTEM	• After warming up, idle the engine. • IACV-AAC valve system is tested by detecting change in engine speed when IACV-AAC valve opening is changed to 0%, 20% and 80%.	Difference in engine speed is greater than 150 rpm between when valve opening is at 80% and at 20%.		• Harness and connector • IACV-AAC valve • Air passage restriction between air inlet and IACV-AAC valve • IAS (Idle adjusting screw) adjustment

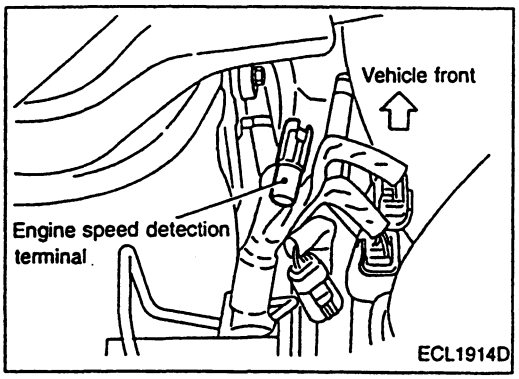
Symptom Matrix Chart

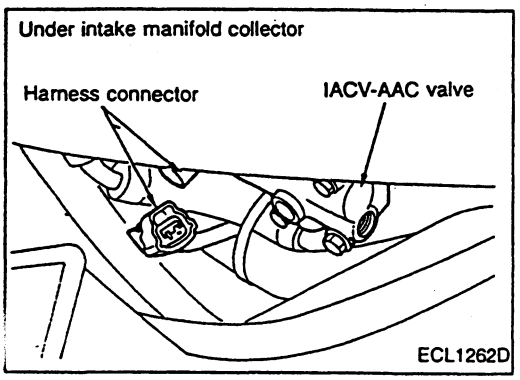
RELATION BETWEEN CONTROL ITEMS AND SENSORS/ACTUATORS

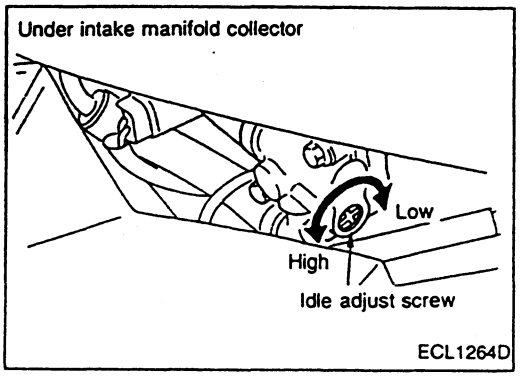
◎: High possibility to control damage
○: Low possibility to control damage

	Sensors and actuators		Control items: Fuel injection control — Fuel injection control	Air/fuel ratio feedback control	Fuel cut control	Ignition timing control	Idle speed control	Fuel pump drive control	Air conditioner cut control	Auxiliary electric fan control	Heated oxygen sensor heater control	Turbo pressure control	Self-diagnosis	Fail-safe
Sensors	Camshaft position sensor		◎	◎	◎	◎	◎	◎	◎	○	◎	○	○	
	Mass air flow sensor		◎	◎	○	◎						○	○	○
	Engine coolant temperature sensor		○	◎	○	○	○	○	◎	◎		○	○	○
	Intake air temperature sensor		○		○								○	
	Heated oxygen sensor			◎							◎			
	Knock sensor					○						○	○	○
	Vehicle speed sensor			○	○		○		○					
	Throttle position sensor		○	○	◎	○	○		◎			○	○	○
	Ignition switch	START	◎	○		○			○	○		○		
		IGN	◎	◎	◎	◎	◎	◎	○	○	○	○		
	Air conditioner switch				○		○		○	○				
	Park/neutral position switch		○	○	○	○	○							
	Power steering oil pressure switch						○		○					
	Battery voltage		○			○	○				○			
Actuators	Injector		◎	◎	◎									
	Dropping resistor		○											
	Ignition coil (built-in power transistor)					◎							○	
	IACV-AAC valve						◎							
	Air regulator						○							
	Fuel pump relay							◎						
	Fuel pump							◎						
	ECM & IGN coil relay		◎	◎	◎	◎	◎	◎	◎	◎	◎	◎		
	Auxiliary electric fan relay						○			◎				
	Air conditioner relay						○		◎	○				
	Wastegate valve control solenoid valve											◎		
Others	FPCM							◎						
	Canister			○								○		









Idle Speed Inspection and Adjustment

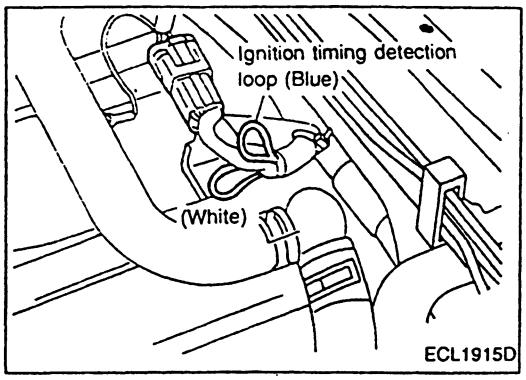
Idle speed specification (After warm-up)

Engine type		RB26DETT
Idle speed		950±50
Base idle speed (Feedback control cancelled)	(rpm)	900
Ignition timing (Feedback control cancelled)	(BTDC°/rpm)	20±1/900
CO density	(%)	0.1, max.
HC density	(ppm)	50, max.

- Warm up engine to normal operating temperature.
- Connect "CONSULT" to the data link connector for CONSULT (under the instrument lower driver panel) and turn ignition switch ON.
- Connect a tachometer to the engine speed detection terminal.
- Check that the air conditioner load, power steering pump load, and various electrical loads are not applied to the engine. Also check that lever is set to Neutral.
- Perform "IACV-AAC VALVE ADJ" in "WORK SUPPORT" mode with CONSULT.
- Disconnect IACV-AAC valve harness connector.

(Above step cancels the idle speed feedback control.)

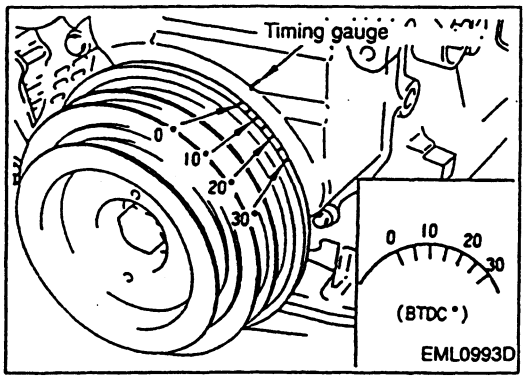
- Turn idle adjust screw (IAS) on the IAA unit to adjust base idle speed to 900 rpm.
- Turning IAS clockwise makes base idle speed lower. Turning IAS counterclockwise makes base idle speed higher.
- Cancel "IACV-AAC VALVE ADJ" in "WORK SUPPORT" mode with CONSULT.
- Connect IACV-AAC valve harness connector.
- Check that the actual idle speed is 950±50 rpm.



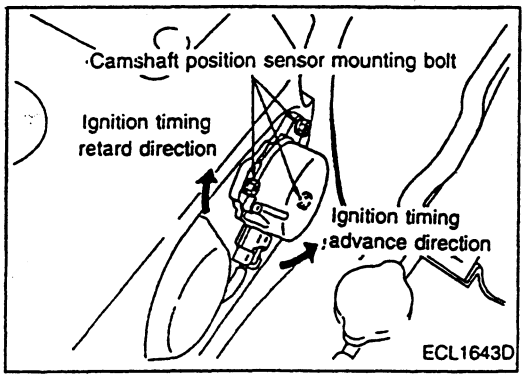
Ignition Timing Inspection and Adjustment

- Install a timing light to the ignition timing detection loop (blue).
- Perform "IACV-AAC VALVE ADJ" in "WORK SUPPORT" mode with CONSULT.
- Disconnect IACV-AAC valve harness connector.

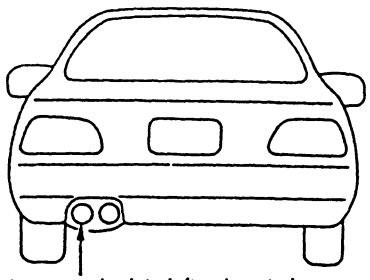
(Above step cancels the idle speed and ignition timing feedback controls.)



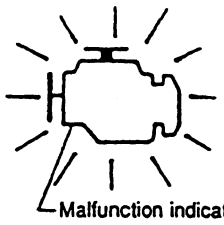
- With the engine idling, check that the ignition timing and base idle speed is BTDC 20°±1/900 rpm.
- If not within the specifications, loosen the camshaft position sensor mounting bolt, turn the camshaft position sensor and adjust the ignition timing to BTDC 20°±1/900 rpm. Turning the camshaft position sensor counterclockwise advances the ignition timing.



- Cancel "IACV-AAC VALVE ADJ" in "WORK SUPPORT" mode with CONSULT.
- Connect IACV-AAC valve harness connector.
- Race engine and check that the ignition timing advances immediately.



ECL1788D



ECO0090D

Air/Fuel Ratio Inspection

CO/HC DENSITY INSPECTION

The vehicle uses air/fuel ratio feedback system with learning function. Because wide range of compensation is available, no CO/HC density adjustment is necessary.

- Warm up engine to normal operating temperature, and check that the idle speed and the ignition timing are within the specifications. Then, check CO/HC density with CO/HC meter.

CAUTION:
For adopting exhaust pressure-sensitive control muffler, insert probe of the CO/HC meter into the left exhaust pipe. (Under no-load condition, exhaust gas is emitted from the left exhaust pipe only.)

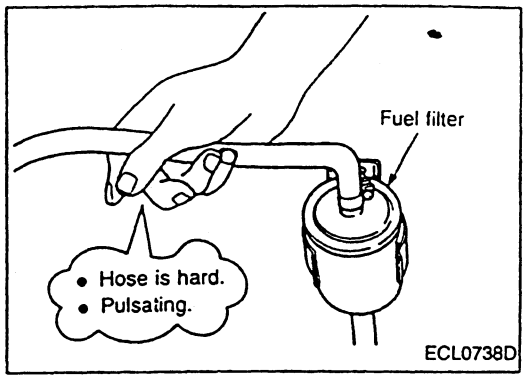
- If not within the specifications, check the air/fuel ratio feedback status as follows.

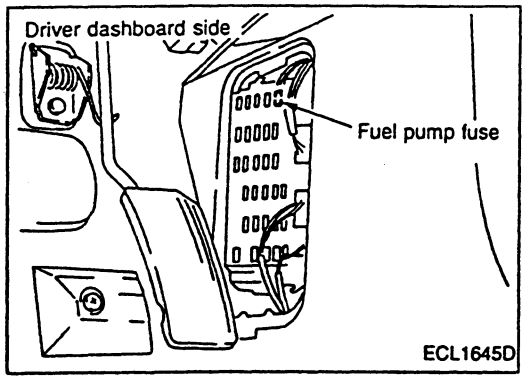
- Select "M/R F/C MNT" (cyl. No. 4 - 6) and "M/R F/C MNT (R)" (cyl. No. 1 - 3) in "DATA MONITOR" mode.
- Run engine at approx. 2,000 rpm or higher and check that "RICH" and "LEAN" are displayed alternately.

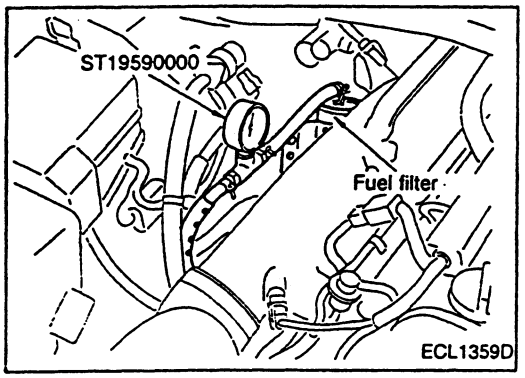
- Turn ignition switch ON and connect terminals CHK and IGN on the data link connector for CONSULT (under instrument lower driver panel) for 2 seconds or more with a suitable harness, then disconnect them.

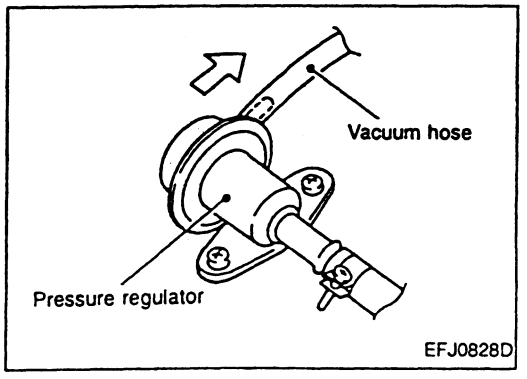
- Warm up the engine to normal operating temperature, then run the engine at 2,000 rpm or higher. Check that the malfunction indicator lamp blinks at least five times in 10 seconds.

CAUTION:
When heated oxygen sensor monitor is initially set in operation, it monitors CO-HC density for No. 1 through No.3 cylinders. CO-HC density for No. 4 through No. 6 cylinders must also be monitored. For monitor selection procedures, refer to "MALFUNCTION INDICATOR LAMP (MIL) INDICATION", "Self-diagnosis", EC-9.









Fuel Pressure Inspection

QUICK INSPECTION

- Turn ignition switch ON (engine not running).
- Select "FUEL PUMP CIRCUIT" in "FUNCTION TEST" mode.
- Pinch fuel feed hose with fingers and check for pulsation.
- Pinch fuel hose between fuel filter and fuel gallery with fingers while fuel pump is operating. Hose should feel hard or pulsating.

INSPECTION USING FUEL PRESSURE GAUGE

Releasing fuel pressure

- Start engine.
- Select "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode.
- Touch "START" and after engine stalls, crank it two or three times to release all fuel pressure.
- Start engine and disconnect fuel pump fuse.
- After engine stalls, crank it two or three times to release all fuel pressure.

Installing fuel pressure gauge

- Connect a fuel pressure gauge (SST) between fuel filter and fuel gallery.

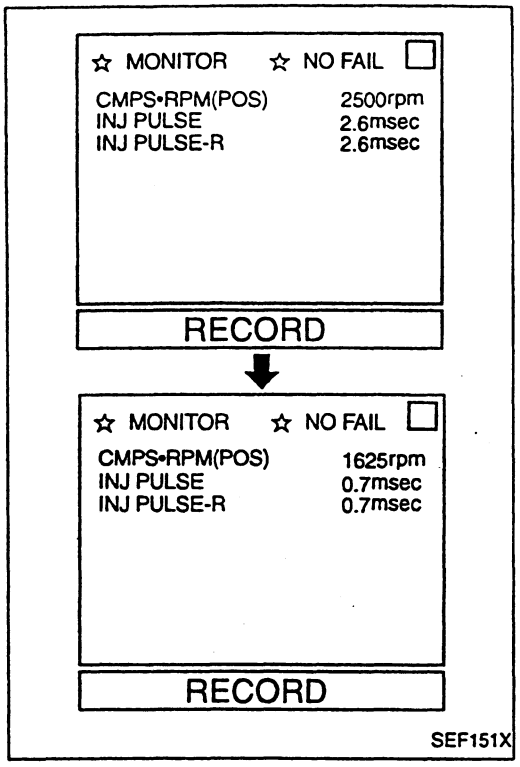
CAUTION:
When disconnecting fuel hose, use shop cloth to remove any fuel leaks.

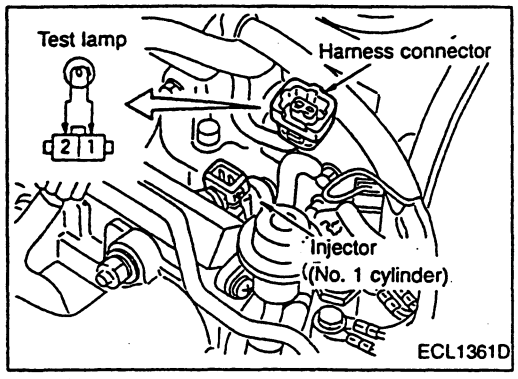
- Clear "FUEL PRESSURE RELEASE".
- Install fuel pump fuse.

Fuel pressure standard value confirmation

- Start engine and check that the fuel pressure is as specified.
 Fuel pressure [MPa (kg/cm^2)]
 At idle: 0.25 (2.5)
 When vacuum hose is disconnected from pressure regulator: 0.29 (3.0)
- If the vehicle shows poor starting, check fuel pressure for approx. 5 seconds after ignition switch is turned ON.
 Fuel pressure [MPa (kg/cm^2)]
 During 5 sec. after ignition switch turned ON:
 0.29 (3.0)
- When fuel pressure is NG
 Too high: Malfunctioning pressure regulator, malfunctioning fuel damper, clogged fuel return line, bent hose
 Too low: Malfunctioning pressure regulator, malfunctioning fuel damper, poor fuel pump discharging, clogged fuel supply line, clogged fuel filter

CAUTION:
Also check fuel pressure at increased engine speed.





Fuel-cut Function Check

1. Select "INJ PULSE" and "INJ PULSE-R" in "DATA MONITOR" mode with CONSULT.
2. Start engine and rev it up to approx. 2,500 rpm.
3. Release accelerator pedal and make sure that "INJ PULSE" instantaneously drops to approx. 0.7 msec.

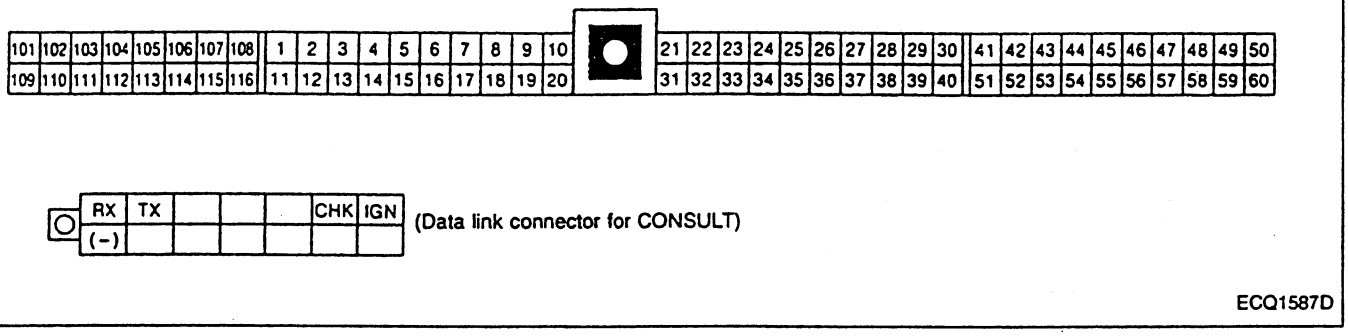
1. Warm up engine to normal operating temperature.
2. Remove injector harness connector and install test lamp instead.
3. When engine is operating at speeds more than approx. 2,500 rpm, release accelerator pedal and make sure that test lamp instantaneously goes out.

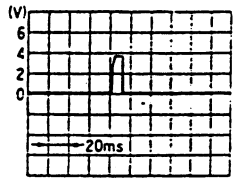
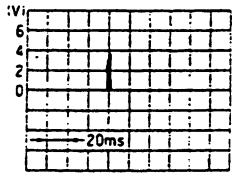
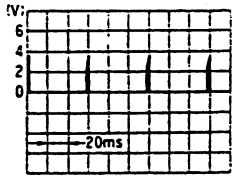
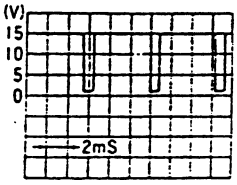
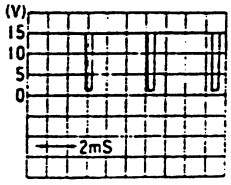
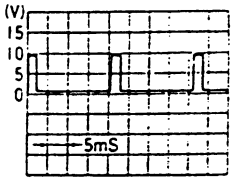
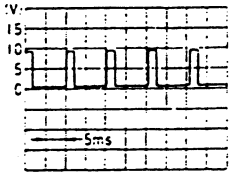
ECM Input/Output Signal Reference Value

SIGNAL VOLTAGES MEASURED WITH OSCILLOSCOPE AND CIRCUIT TESTER

Signal voltages measured at ECM terminals with a circuit tester and example of waveforms displayed on an oscilloscope are shown below.

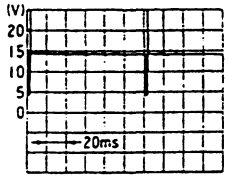
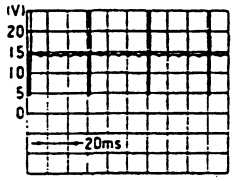
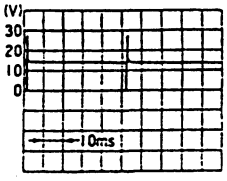
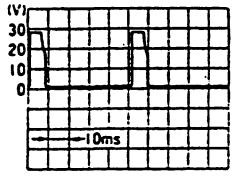
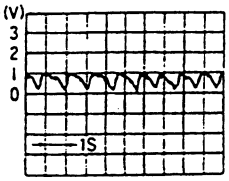
Measured data are affected by many factors such as irregularity of parts, vehicle history, operating conditions, environment, service status, and measuring instruments and methods.



Terminal No.	Signal name	At idle	At approx. 2,000 rpm
1 2 3 11 12 13	Ignition signal (power transistor drive signal)	When cranking: Approx. 0.06 - 0.09V  ECL1925D At idle: Approx. 0.06 - 0.09V  ECL1926D	Approx. 0.08V  ECL1927D
4	IACV-AAC valve control signal	Battery voltage  	Battery voltage 
6	Auxiliary electric cooling fan relay control signal	Fan stopped: Battery voltage Fan operating: Approx. 0.2V	←
7	Tachometer drive signal	Approx. 1V  	Approx. 2V  ECL1928D
8 (IGN)	Ignition switch (IGN) signal	Ignition switch OFF: Approx. 0V Ignition switch ON: Battery voltage	←
9	Air conditioner relay control signal	Air conditioner OFF: Battery voltage Air conditioner ON: Approx. 1V	←

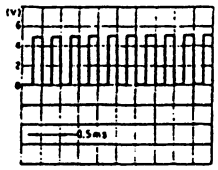
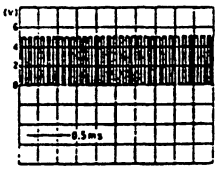
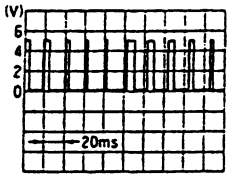
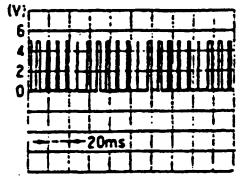
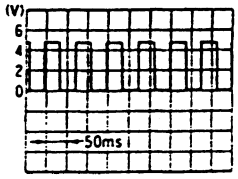
NOTE: Above voltages are measured values obtained by analog circuit tester.

ECM Input/Output Signal Reference Value (Cont'd)

Terminal No.	Signal name	At idle	At approx. 2,000 rpm
16	ECM & IGN coil relay control signal	Approx. 1V (2 seconds after ignition switch is turned OFF: Battery voltage)	←
17	Injection pulse monitor signal (Ti monitor)	Battery voltage  ECL1936D	Battery voltage  ECL1937D
18	Fuel pump relay control signal	Approx. 0.8V (Within 5 seconds after ignition switch is turned ON: Approx. 0.8V Thereafter: Battery voltage)	←
19	Power steering oil pressure switch signal	Steering wheel not turned: Approx. 4.5V Steering wheel turned: Approx. 0V	←
21 (RX)	Receive (Data input to control unit)	CONSULT connected: Approx. 0.2V CONSULT disconnected: Battery voltage	←
22 (TX)	Transmit (Data output from control unit)	CONSULT connected: Approx. 9V, max. CONSULT disconnected: Approx. 0V	←
23 24	Knock sensor signal	Approx. 0.4 - 2V* *: Voltages varies with measuring range (internal resistance) of a circuit tester.	←
25	Wastegate valve control solenoid valve control signal	Battery voltage  ECL1938D	At more than approx. 2,200 rpm: Approx. 4V  ECL1939D (Duty ratio: Approx. 85%)
26, 34	Mass air flow sensor ground	Approx. 0V	←
27	Mass air flow sensor signal (R) (No. 4 - 6 cylinders)	Approx. 0.8V	Approx. 1.2V
28	Engine coolant temperature sensor signal	Engine coolant temperature at approx. 20°C: Approx. 3.5V Engine coolant temperature at approx. 80°C: Approx. 1.2V	←
29	Heated oxygen sensor signal (R)(No. 1 - 3 cylinders)	Clamped in 0.1 to 0.6V range (approx.)	Fluctuates between approx. 0.1 to 0.3V and approx. 0.6 to 1V 
30, 50, 60, 108, 116	Ground	Approx. 0V	←
32	Malfunction indicator lamp	Lamp OFF: Battery voltage Lamp ON: Approx. 0V	←

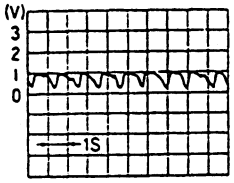
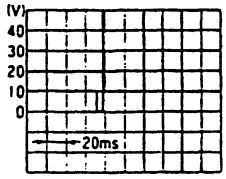
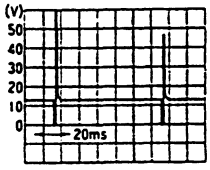
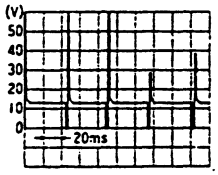
NOTE: Above voltages are measured values obtained by analog circuit tester.

ECM Input/Output Signal Reference Value (Cont'd)

Terminal No.	Signal name	At idle	At approx. 2,000 rpm
35	Mass air flow sensor signal (No. 1 - 3 cylinders)	Approx. 0.8V	Approx. 1.2V
36	Intake air temperature sensor signal	Intake air temperature at approx. 20°C: Approx. 3.5V Intake air temperature at approx. 80°C: Approx. 1.2V	←
38	Throttle position sensor signal	Approx. 0.5V (Ignition switch ON, engine not running) Throttle fully closed: Approx. 0.5V Throttle fully open: Approx. 4.2V	Approx. 1V (Voltage increases in response to accelerator pedal depression)
41	Camshaft position sensor 1° (POS) signal	Approx. 2.6V  ECL0116D	Approx. 2.6V  ECL0117D
42 52	Camshaft position sensor 120° (REF) signal	Approx. 1.3V  ECL1929D	Approx. 1.3V  ECL1930D
43	Ignition switch (START) signal	0V (Ignition switch START: Battery voltage)	←
44	Park/Neutral position switch signal	Select lever in Neutral: Approx. 0V Select lever in other than Neutral: Approx. 4.5V	←
46	Air conditioner switch signal	Air conditioner OFF: Approx. 4.7V Air conditioner ON: Approx. 0V	←
47 (CHK)	Check (Diagnosis start)	CONSULT connected: Approx. 0V CONSULT disconnected: Approx. 0V	←
48	Throttle position sensor power supply	Approx. 5V	←
49, 59	Control unit power supply	Battery voltage	←
53	Vehicle speed sensor signal	Approx. 4.8V or 0V	When driving at approx. 40 km/h: Approx. 2.2V  ECL1940D

NOTE: Above voltages are measured values obtained by analog circuit tester.

ECM Input/Output Signal Reference Value (Cont'd)

Terminal No.	Signal name	At idle	At approx. 2,000 rpm
54	IMMU	Battery voltage	←
55	Heated oxygen sensor signal (No. 4 - 6 cylinders)	Clamped in 0.1 to 0.6V range (approx.)	Fluctuates between approx. 0.1 to 0.3V and approx. 0.6 to 1.0V 
56	Throttle opening signal	Approx. 0.5V (Ignition switch ON, engine not running) Throttle fully closed: Approx. 0.5V Throttle fully open: Approx. 4.2V	Approx. 1V (Voltage increases in response to accelerator pedal depression.)
58	Battery power supply	Battery voltage (constant)	←
101 103 105 110 112 114	Injector drive signal	When cranking: Battery voltage  ECL1931D At idle: Battery voltage  ECL0130D	Battery voltage  ECL0131D
104	Fuel pump terminal voltage control output signal (FPCM) 1	Within approx. 1 second after engine starts: Approx. 4V Thereafter: Approx. 2V	Approx. 2V
106	Fuel pump terminal voltage control output signal (FPCM) 2	Within approx. 1 second after engine starts: Approx. 4V Thereafter: Approx. 2V	Approx. 2V
109	Back electromotive current feedback circuit	Battery voltage (constant)	←
115	Heated oxygen sensor heater control signal	Approx. 0.3V (Ignition switch ON: Battery voltage)	← (Battery voltage at approx. 2,800 rpm, min.)

NOTE: Above voltages are measured values obtained by analog circuit tester.

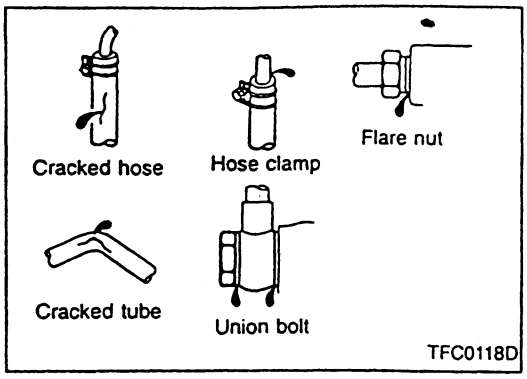
SECTION TF

MODIFICATION NOTICE:

- GT-R model has been added.
- ATTESA E-TS system has been added.
- ATTESA E-TS PRO system has been added.
 (For hydraulic oil and component parts, refer to PD section. For trouble diagnostic procedures, refer to BR section.)

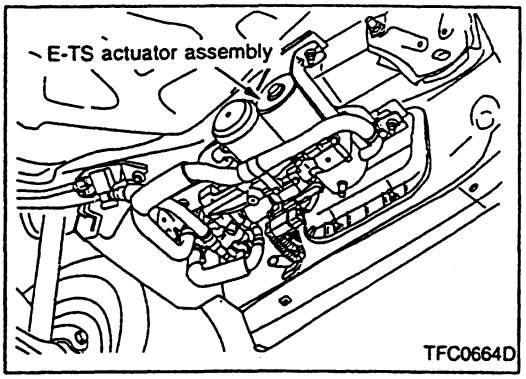
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Oil Level Inspection 2
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Evacuation 7
Oil Pressure Inspection 8
E-TS Lock Inspection 9
COMPONENT PARTS REMOVAL AND INSTALLATION 11
E-TS Actuator 11
Accumulator 12
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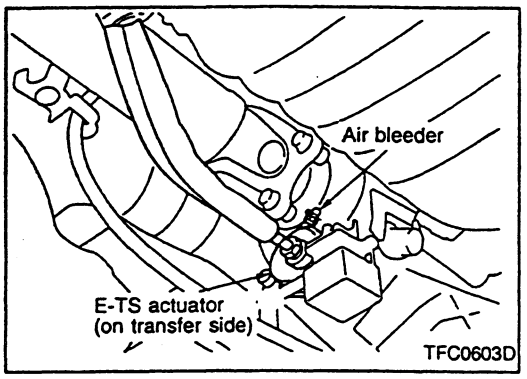


Leakage Inspection

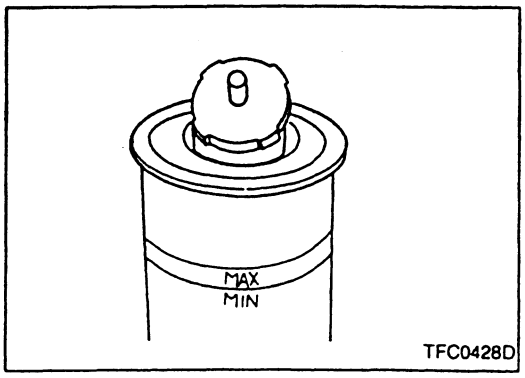
- Check hoses and tubes for leakage at connections. Also check for scratches, twisting, deformation, interference with adjacent parts and loose connections. Repair or replace faulty parts if necessary.
- Check reservoir tank and cap for damage, deformation and leakage. Replace faulty parts with new ones.



- Check E-TS actuator air bleeder and connections for leakage. Repair or replace faulty parts if necessary. If leakage at or around E-TS actuator is noted, replace it as a E-TS actuator assembly.



- Check air bleeder (on transfer actuator side) and connections for leakage. Repair or replace faulty parts if necessary. If leakage at or around transfer actuator is noted, replace it as a transfer actuator assembly.
- If hydraulic oil in reservoir tank is reduced although actuator, piping and tank are free from leakage, it may be leaking into transfer interior. If necessary, disassemble transfer to check and locate the cause of leakage.

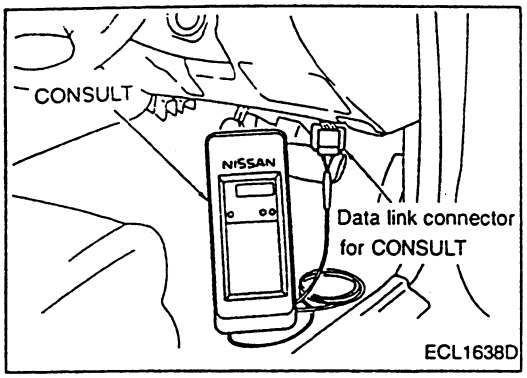


Oil Level Inspection

1. Remove E-TS oil level access lid from right side of trunk room.
2. Turn ignition switch ON. Make sure that oil level is within the MAX-MIN lines on reservoir tank.

CAUTION:

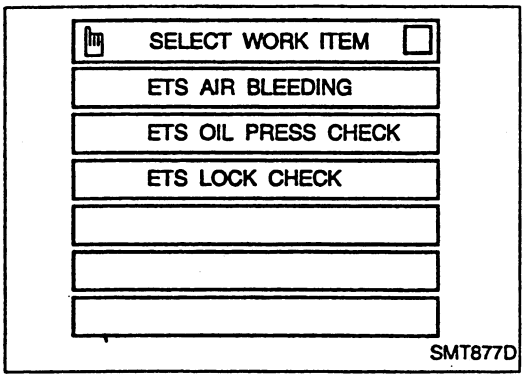
- **If ignition switch has been turned OFF for a long period of time, oil in E-TS actuator might return to reservoir tank, causing oil level to exceed MAX line. Be sure to turn ignition switch ON before checking oil level.**
- **When replenishing oil, be careful not to spill it into trunk room.**



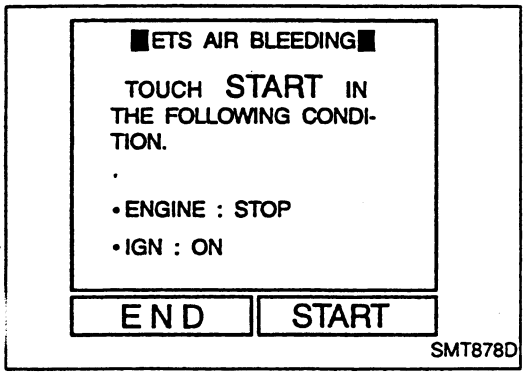
Air Bleeding

WITH CONSULT

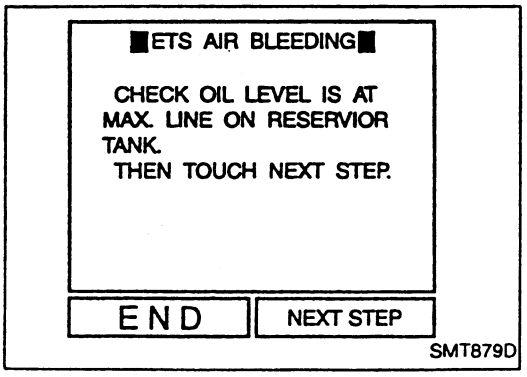
1. Turn ignition switch OFF.
2. Connect CONSULT to data link connector.
3. Turn ignition switch ON.
4. Touch "START", "ABS" and "WORK SUPPORT" on CONSULT.



5. Touch "ETS AIR BLEED".

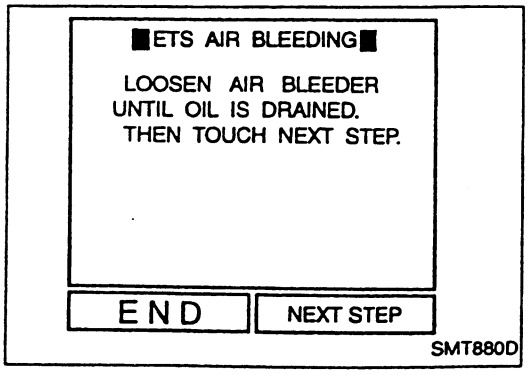


6. Touch "START".



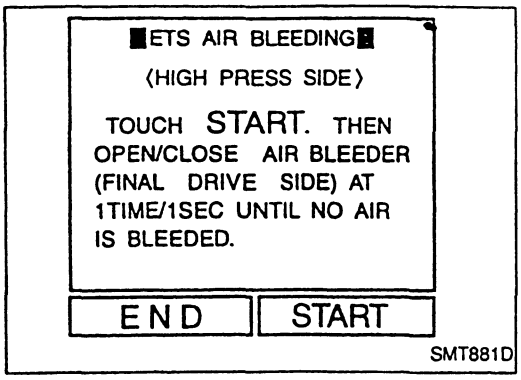
7. Pour oil into reservoir tank until oil level is approx. 30 mm above MAX line. Touch "NEXT".

CAUTION:
When replenishing oil, be careful not to spill it into trunk room.

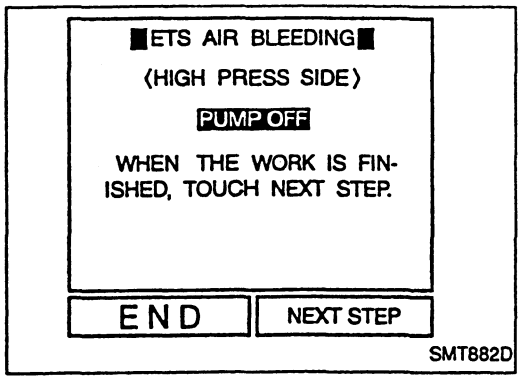


8. Open E-TS actuator air bleeder and bleed air from suction line (reservoir tank-to-E-TS actuator). Then tighten air bleeder to specified torque.
 Air bleeder tightening torque:
 5.9 - 7.8 N·m (0.6 - 0.8 kg-m)
9. Touch "NEXT STEP".

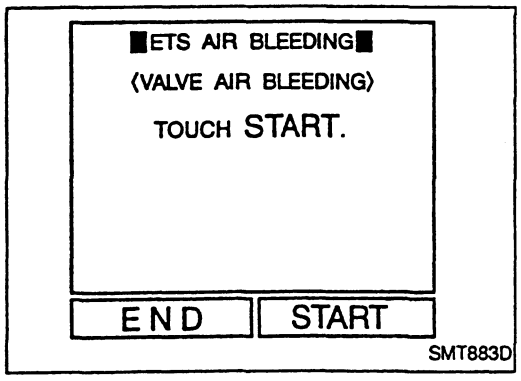
Air Bleeding (Cont'd)



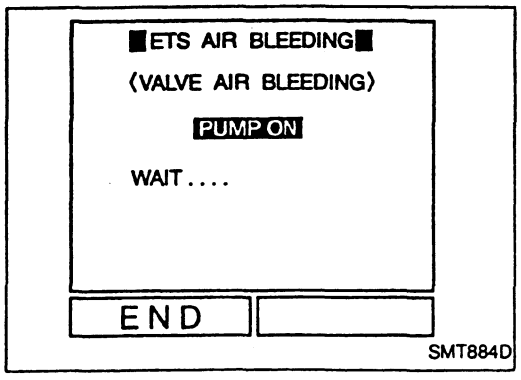
10. Touch "START". Bleed air from transfer actuator.



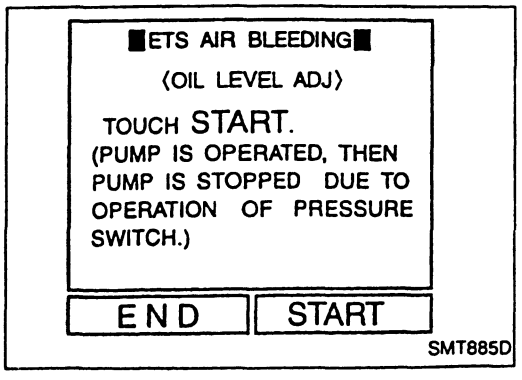
11. Tighten air bleeder to specified torque. Touch "NEXT STEP".
 Air bleeder tightening torque:
 5.9 - 9.8 N·m (0.6 - 1.0 kg-m)



12. Touch "START". Bleed air from reservoir tank return line.

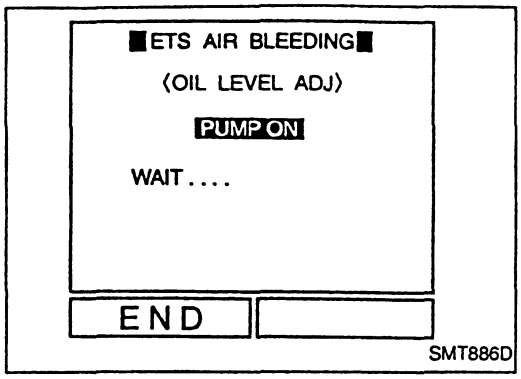


13. Touch "END".

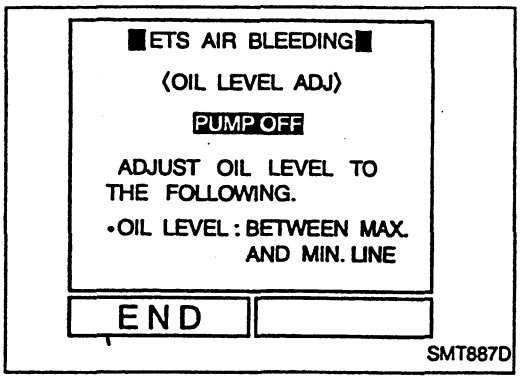


14. Touch "START".

Air Bleeding (Cont'd)



15. When "PUMP OFF" appears on display in place of "PUMP ON", check and correct oil level in reservoir tank.



16. Touch "END".

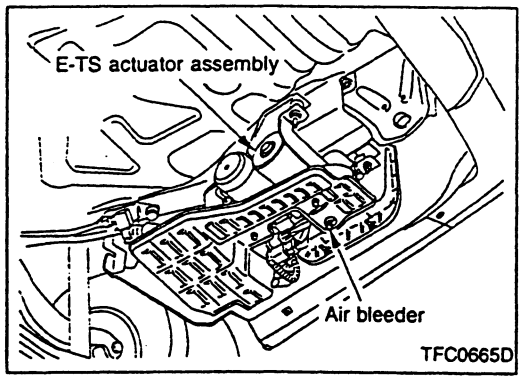
- **"STOP" may appear on display. This occurs when engine is started and vehicle is driven or when E-TS/ABS system malfunctions, during air bleeding procedures. When it appears, suspend air bleeding procedures and perform self-diagnostic procedures for E-TS system. Repair faulty areas.**
- **"EMERGENCY STOP" appears on display when E-TS/ABS system malfunctions and air bleeding operation is performed under a fail-safe condition. (When oil level is lower than specified level after new actuator assembly or pipes are installed, turning ignition switch ON may set E-TS/ABS system in a fail-safe condition.)**

Air Bleeding (Cont'd)

WITHOUT CONSULT

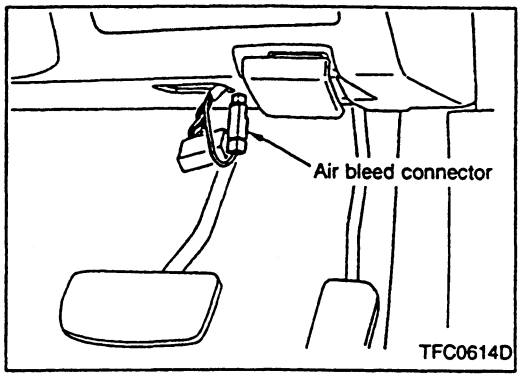
1. Pour oil into reservoir tank until oil level is approx. 30 mm above MAX line.

CAUTION:
When replenishing oil, be careful not to spill it into trunk room.

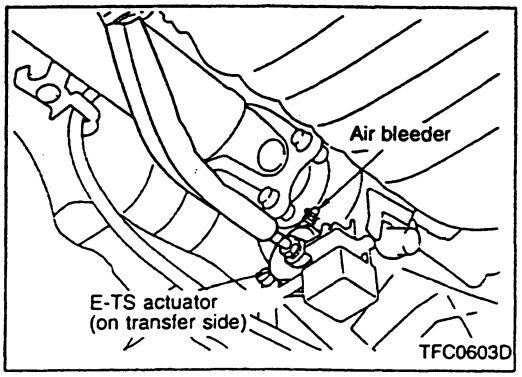


Before air bleeding procedures are performed, make sure that ignition switch is OFF.

2. Open E-TS actuator air bleeder. Bleed air from suction line (reservoir tank-to-E-TS actuator) until air no longer is discharged from air bleeder opening. Close air bleeder and tighten it to specified torque.
 Air bleeder tightening torque:
 5.9 - 7.8 N·m (0.6 - 0.8 kg-m)
- When air bleeder is opened, oil inside suction line flows downward by gravity.



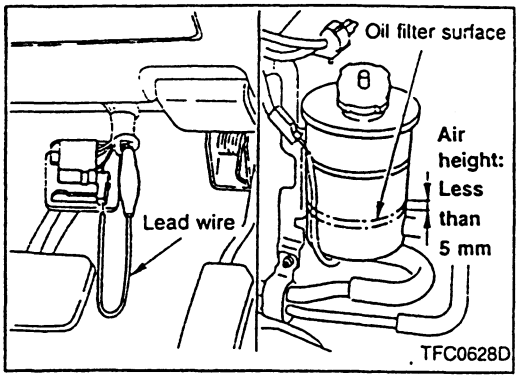
3. Turn ignition switch ON without starting engine.
4. Remove air bleed connector located at lower instrument panel on driver's side.
- When air bleed connector is removed, its wiring will be open and set in air bleed mode. At the same time, pump motor operates for several seconds and stops. Thus, a certain degree of oil pressure occurs on transfer actuator side.



5. Open air bleeder on transfer actuator side and bleed air from actuator. Then tighten air bleeder to specified torque.
 Air bleeder tightening torque:
 5.9 - 9.8 N·m (0.6 - 1.0 kg-m)

CAUTION:
- **Be sure to open air bleeder when pump motor is inoperative. As soon as pump motor starts, close air bleeder.**
- **Do not operate pump motor for more than 10 seconds at a time.**
- **Make sure that hydraulic oil in reservoir tank is free from air sucking due to insufficient hydraulic oil quantity. If air sucking is noted, perform air bleeding procedures all over again.**

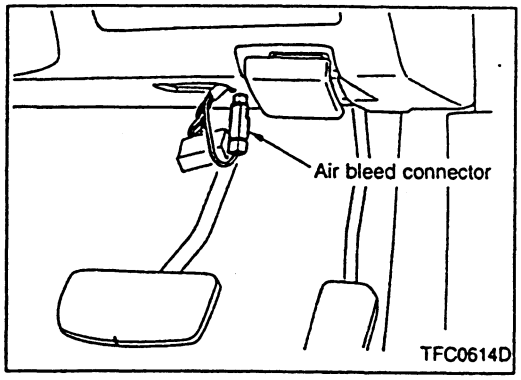
Air Bleeding (Cont'd)



6. Connect and disconnect the wire lead to and from air bleed connector intermittently in response to ON-OFF operation of motor pump in order to bleed air from reservoir tank return line. Refer to the figure at left as a guide for air volume to be bled.

CAUTION:
Do not operate pump motor for more than 10 seconds at a time.

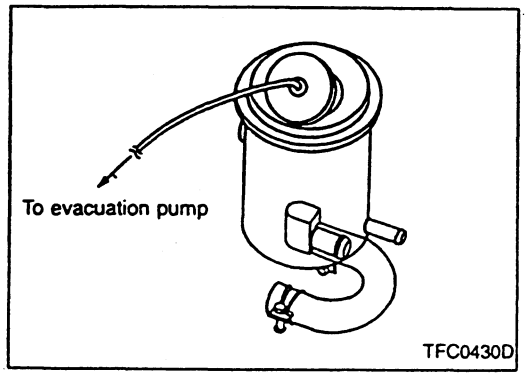
7. Replace air bleed connector in its original position and check oil level in reservoir tank.



Evacuation

After replacing actuator assembly, pipes, etc. with new ones, abnormal noise may be emitted at or around actuator when engine is started. When it occurs, evacuate actuator and hydraulic line so that air is completely expelled from these parts.

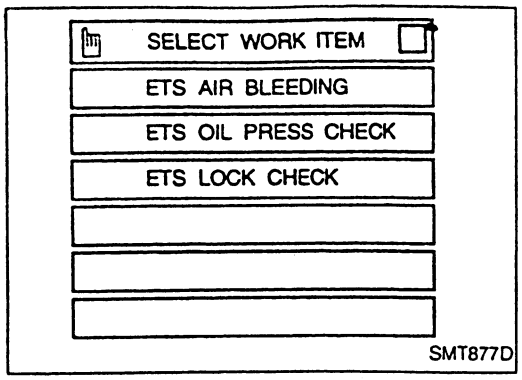
1. Make sure that pipe connections are tight, and that reservoir tank oil level is correct.
2. Remove air bleed connector and turn ignition switch ON. Within 10 seconds after ignition switch has been turned ON, depress brake pedal 5 times to set vehicle in 2WD mode. At this point, make sure that 4WD warning lamp blinks 2 times per second.



3. Remove cover from reservoir tank cap. Connect a vacuum hose or air conditioner evacuation pump to reservoir tank cap. Evacuate reservoir tank at a vacuum pressure of more than −96 kPa (720 mmHg) for at least 10 minutes.
- Use a gauge manifold to check vacuum pressure discharged.

CAUTION:
- **Completely clean vacuum hose to be used for evacuating reservoir tank since it may have been used with different types of oil. Failure to follow this instruction results in oil leakage.**
- **Upon completion of evacuation procedures, completely wipe clean traces of oil from cap surface.**

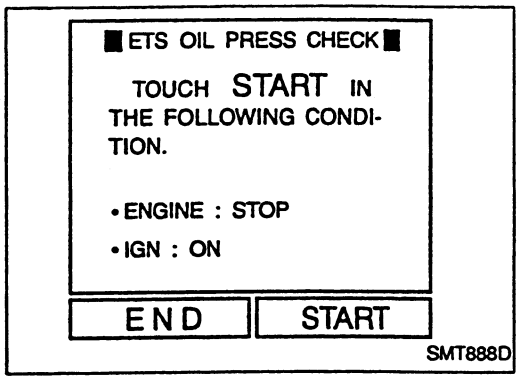
4. Connect air bleed connector in its original position. Return vehicle operation from 2WD mode to 4WD mode. Check and correct reservoir tank oil level. Turn ignition switch OFF.



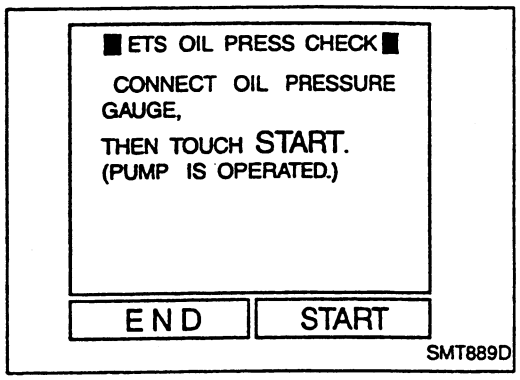
Oil Pressure Inspection

WITH CONSULT

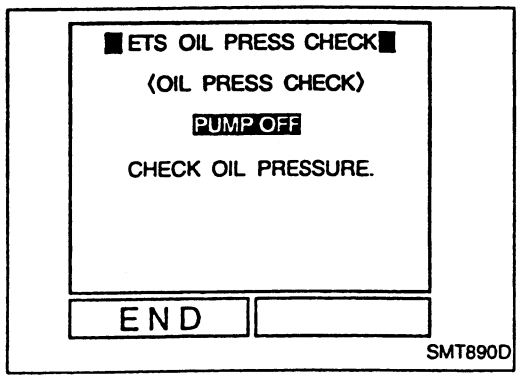
1. Turn ignition switch OFF.
2. Connect CONSULT to data link connector.
3. Turn ignition switch ON.
4. Touch "START", "ABS" and "WORK SUPPORT" on CONSULT.
5. Touch "ETS OIL PRESS CHECK".



6. Touch "START".

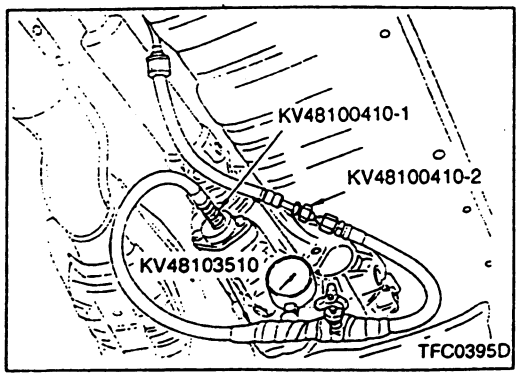


7. Set oil pressure gauge in position on vehicle. Bleed air from hydraulic oil line.
8. Touch "START".



9. Check oil pressure.
 Oil pressure:
 Approx. 0.30 - 0.49 MPa (3.0 - 5.0 kg/cm^2)
10. Touch "END".

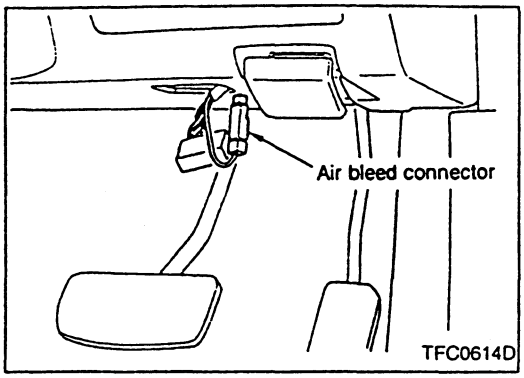
CAUTION:
Upon completion of oil pressure inspection, bleed air from hydraulic circuit.



WITHOUT CONSULT

1. Raise vehicle off the ground. Install an oil pressure gauge (special service tool) in line between E-TS actuator and transfer actuator, then open valve.
2. Bleed air from hydraulic circuit.

Oil Pressure Inspection (Cont'd)



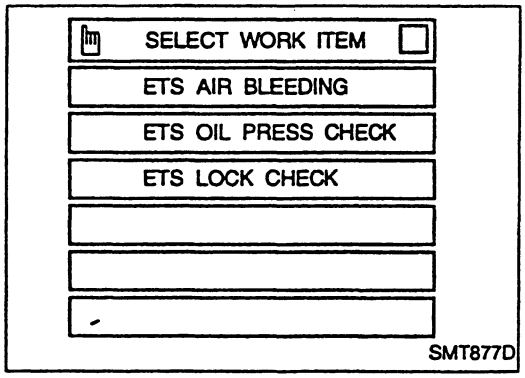
3. Turn ignition switch ON without starting engine.
4. Remove air bleed connector and check oil pressure when E-TS actuator motor operates.
 Oil pressure:
 Approx. 0.30 - 0.49 MPa (3.0 - 5.0 kg/cm^2)

CAUTION:
Do not operate actuator motor for more than 10 seconds at a time.

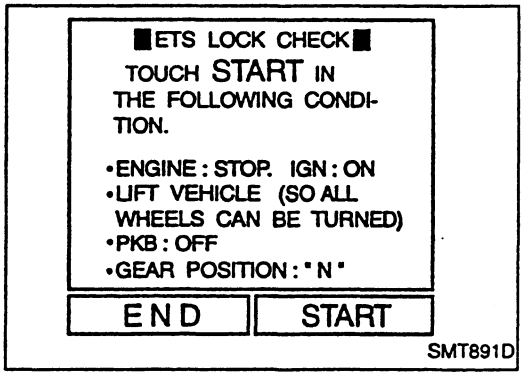
5. Remove oil pressure gauge and bleed air from hydraulic circuit.

E-TS Lock Inspection

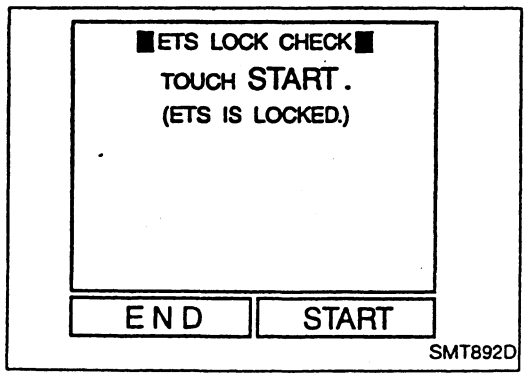
WITH CONSULT



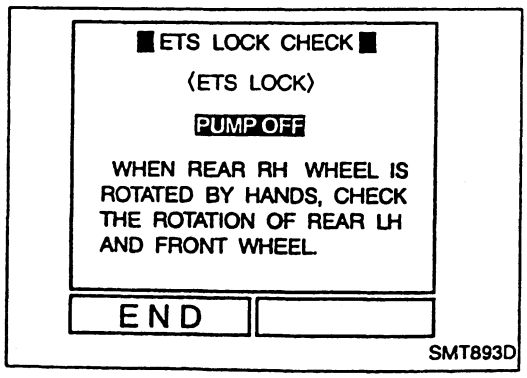
1. Turn ignition switch OFF.
2. Connect CONSULT to data link connector.
3. Turn ignition switch ON.
4. Touch "START", "ABS" and "WORK SUPPORT" on CONSULT.
5. Touch "ETS LOCK CHECK".



6. Raise right front and right rear wheels off the ground using garage jacks. Securely chock left front and left rear wheels.
7. Move A/T select lever to Neutral, then release parking brake.
8. Touch "START".



9. Touch "START".



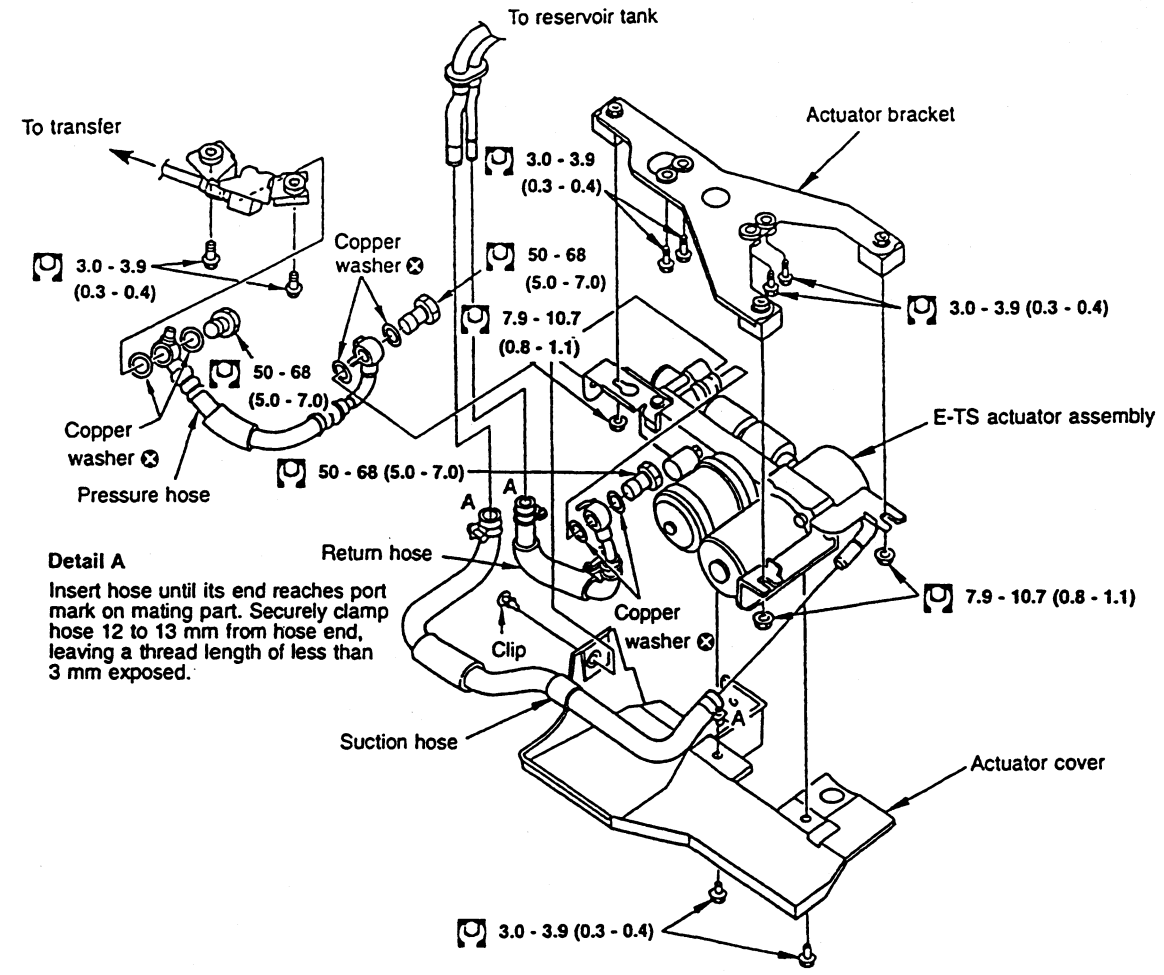
10. Slowly turn right rear wheel by hand to make sure that right front wheel also turns.
11. Upon completion of inspection procedures, touch "END".

E-TS Lock Inspection (Cont'd)

WITHOUT CONSULT

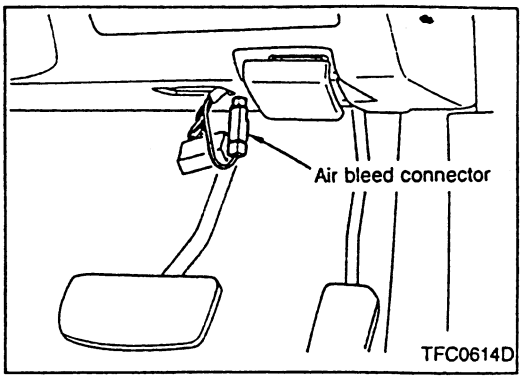
1. Turn ignition switch OFF.
2. Raise right front and right rear wheels off the ground using garage jacks. Securely chock left front and left rear wheels.
3. Move A/T select lever to Neutral, then release parking brake.
4. Turn ignition switch ON without starting engine. Remove air bleed connector and operate E-TS actuator.
5. Slowly turn right rear wheel by hand to make sure right front wheel also turns.
6. Connect air bleed connector in its original position.

E-TS Actuator



CAUTION:

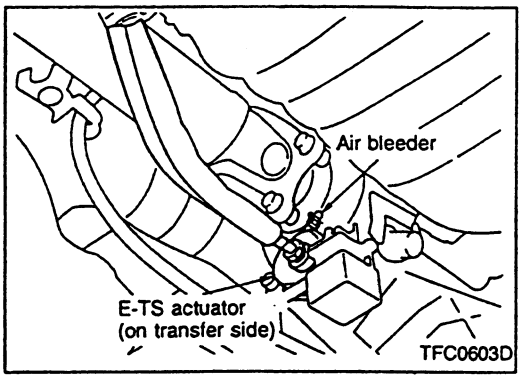
- **Always replace copper washers with new ones after every disassembly.**
- **When removing and installing E-TS actuator, be especially careful not to allow foreign particles (dust, dirt, etc.) to enter actuator.**



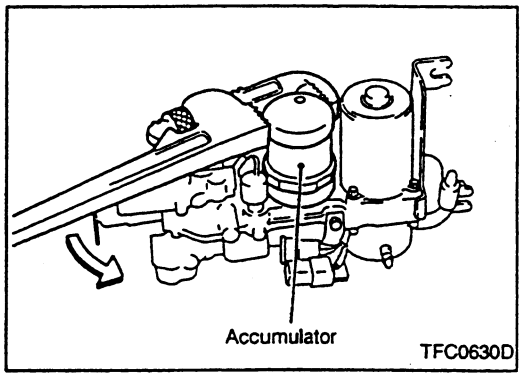
Accumulator

REMOVAL

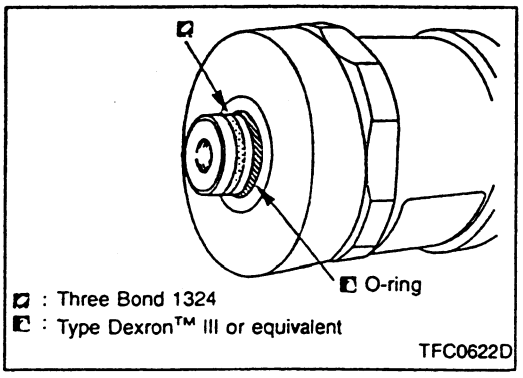
1. Relieve oil pressure of hydraulic unit.
1) Turn ignition switch OFF.
2) Remove air bleed connector.
3) Remove motor relay connector.
4) Open air bleeder on transfer actuator side.



5) Start engine.
6) After 4WD warning lamp has been illuminated for 30 seconds, turn ignition switch OFF.
7) Repeat steps 5) and 6) until hydraulic oil no longer discharges from hydraulic unit.
8) Upon completion of hydraulic oil discharge procedures, start engine and turn ignition switch OFF.



2. Remove E-TS actuator.
3. Using pipe wrench, remove accumulator from E-TS actuator.

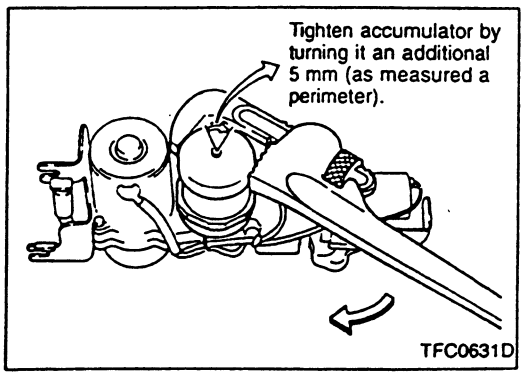


INSTALLATION

1. With accumulator mating surface of E-TS actuator facing down, remove traces of old Lock Tite.

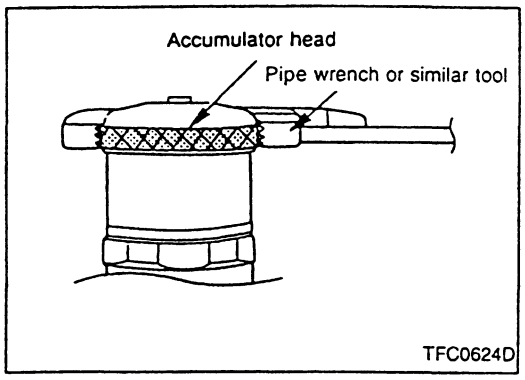
CAUTION:
Be especially careful not to allow Lock Tite to enter oil line.

2. Apply a coat of Lock Tite (Three Bond 1324) to center of accumulator threads.
3. Apply a coat of Type Dexron™ III or equivalent to the entire perimeter of O-ring.



4. Attach accumulator to E-TS actuator and manually screw it into actuator completely. Using pipe wrench, tighten accumulator by turning it an additional 5 mm (as measured perimeter).
 Tightening torque (reference):
 40 - 41 N·m (4.0 - 4.2 kg-m)

Accumulator (Cont'd)



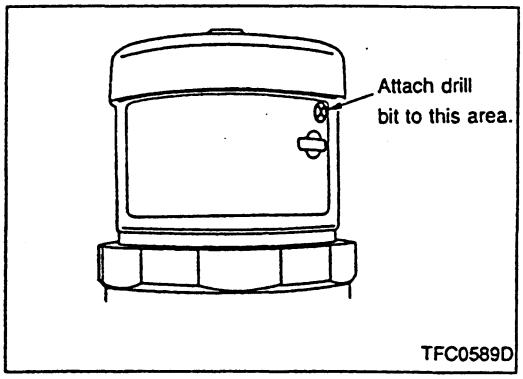
CAUTION:

- **If accumulator is accidentally scratched, repair it by applying a coat of black paint to that area.**
- **Attach pipe wrench to accumulator head as shown in the figure at left.**

5. Install E-TS actuator.

CAUTION:

Upon completion of installation procedures, be sure to bleed air from hydraulic circuit.



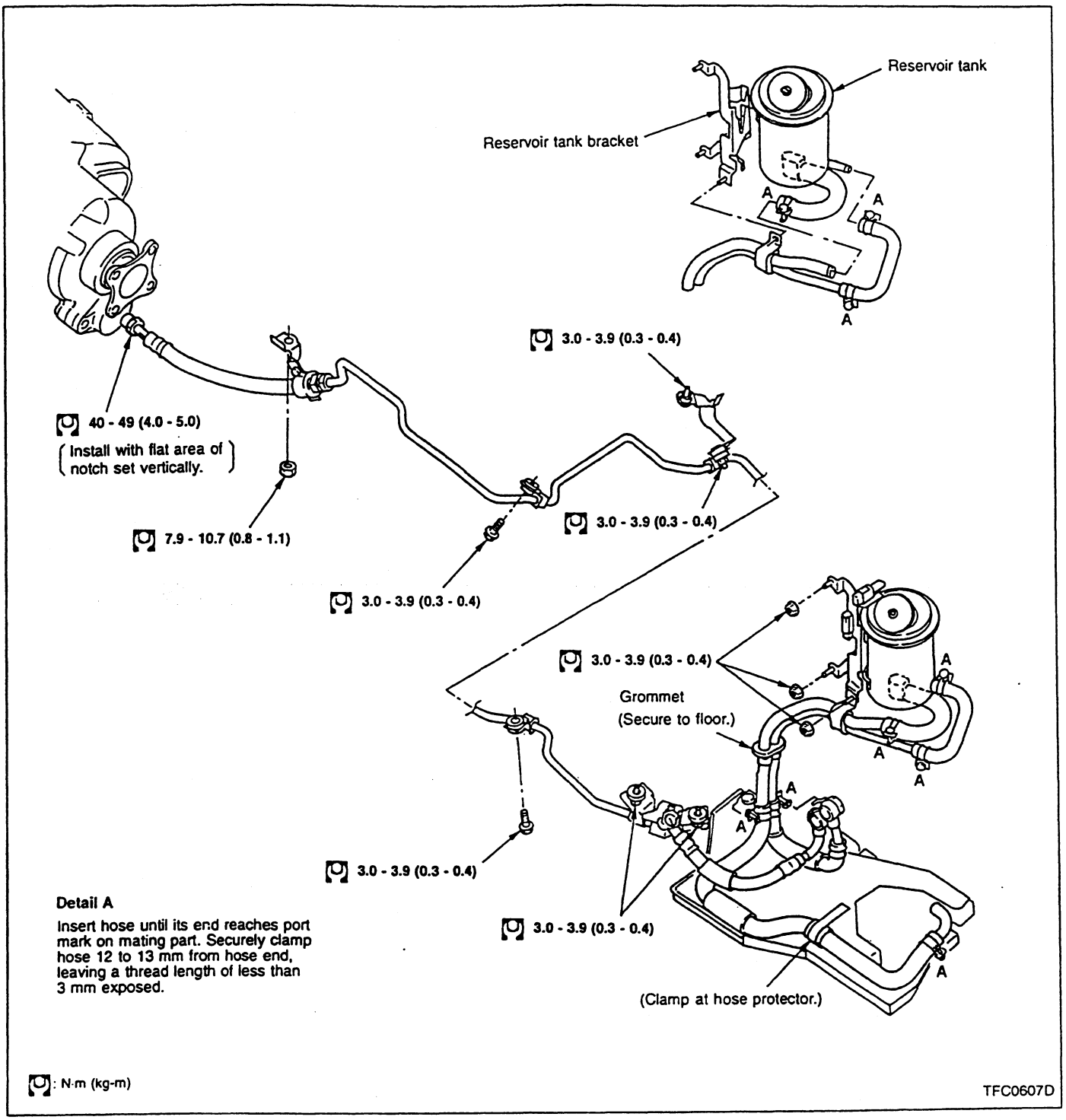
DISPOSAL PROCEDURES

Observe the instructions indicated on caution label on accumulator before disposing of accumulator. Drill a hole on accumulator as shown in the figure at left to completely expel gaseous nitrogen from accumulator.

CAUTION:

- **Accumulator is charged with high-pressure gaseous nitrogen. Under no circumstances should accumulator be disassembled or fused using a welding tool.**
- **Wear goggles before drilling a hole on accumulator.**
- **Be sure to drill as small a hole as possible so that internal pressure can be gradually expelled from accumulator.**

Hydraulic Lines



CAUTION:

- **Always replace copper washers with new ones after every disassembly.**
- **When removing and installing piping, hoses, etc., be especially careful not to allow foreign particles (dust, dirt, etc.) to enter hydraulic lines.**

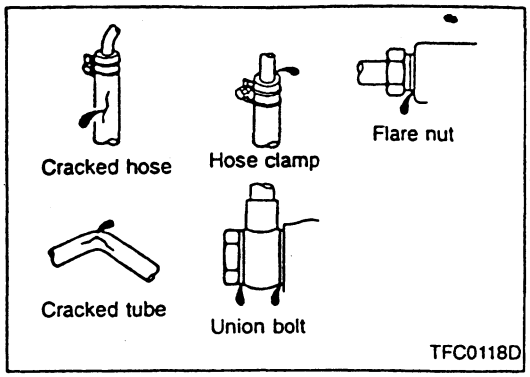
PROPELLER SHAFT & DIFFERENTIAL CARRIER

SECTION PD

MODIFICATION NOTICE:
E-TS PRO system has been added to GT-R V spec. model.

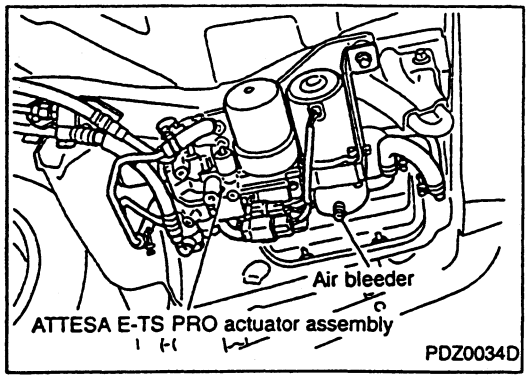
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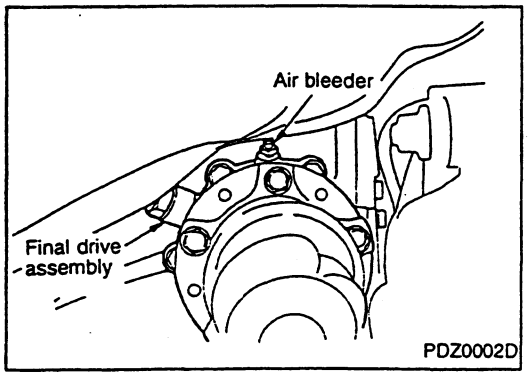
Leakage Inspection

- Check hoses and tubes for leakage at connections. Also check for scratches, twisting, deformation, interference with adjacent parts and loose connections. Repair or replace faulty parts if necessary.
- Check reservoir tank and cap for damage, deformation and leakage. Replace faulty parts with new ones.



- Check ATTESA E-TS PRO actuator air bleeder and connections for leakage. Repair or replace faulty parts if necessary.

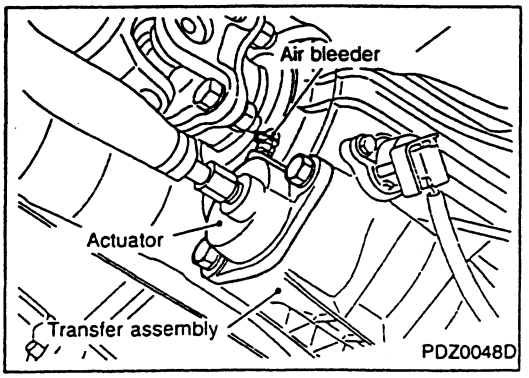
CAUTION:
If leakage at or around ATTESA E-TS PRO actuator is noted, replace it as a ATTESA E-TS PRO actuator assembly.



- Check air bleeder (on final drive actuator side) and connections for leakage. Repair or replace faulty parts if necessary.

CAUTION
If leakage at or around final drive actuator is noted, replace it as a final drive actuator assembly.

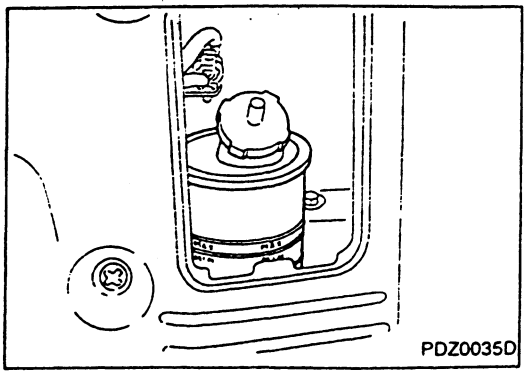
- If hydraulic oil in reservoir tank is reduced although actuator, piping and tank are free from leakage, it may be leaking into final drive interior. If necessary, disassemble final drive to check and locate the cause of leakage.



- Check air bleeder (on transfer actuator side) and connections for leakage. Repair or replace faulty parts if necessary.

CAUTION
If leakage at or around transfer actuator is noted, replace it as a transfer actuator assembly.

- If hydraulic oil in reservoir tank is reduced although actuator, piping and tank are free from leakage, it may be leaking into final drive interior. If necessary, disassemble transfer to check and locate the cause of leakage.



Oil Level Inspection

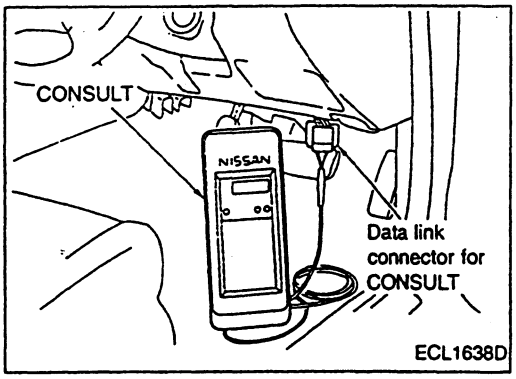
1. Remove ATTESA E-TS PRO oil level access lid from right side of trunk room.
2. Turn ignition switch ON. Make sure that oil level is within the MAX-MIN lines on reservoir tank.

CAUTION:

- **If ignition switch has been turned OFF for a long period of time, oil in ATTESA E-TS PRO actuator might return to reservoir tank, causing oil level to exceed MAX line. Be sure to turn ignition switch ON before checking oil level.**
- **Always use genuine Nissan Power Steering Fluid Special**

Oil Level Inspection (Cont'd)

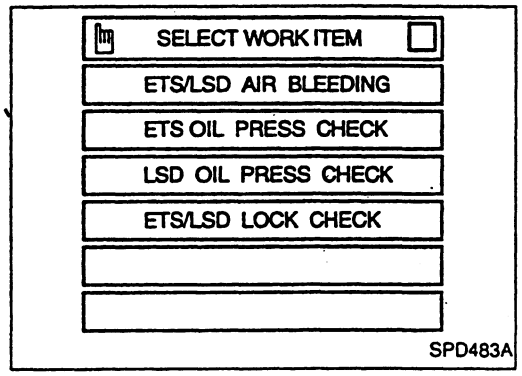
in reservoir tank. When replenishing oil, be careful not to spill it into trunk room.



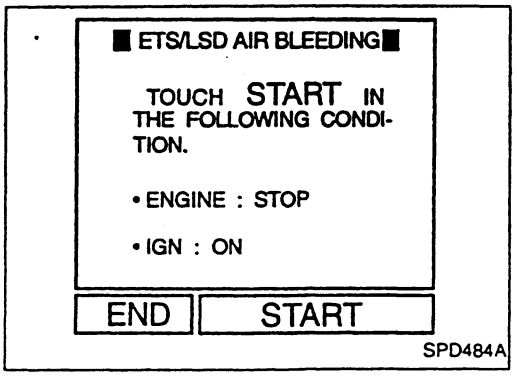
Air Bleeding

WITH CONSULT

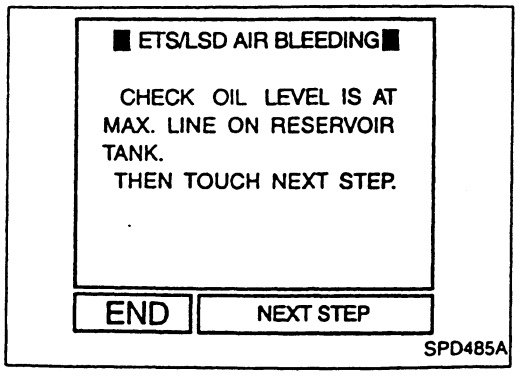
1. Turn ignition switch OFF.
2. Connect CONSULT to data link connector.
3. Turn ignition switch ON.
4. Touch "START", "ABS" and "WORK SUPPORT" on CONSULT.



5. Touch "ETS/LSD AIR BLEEDING".



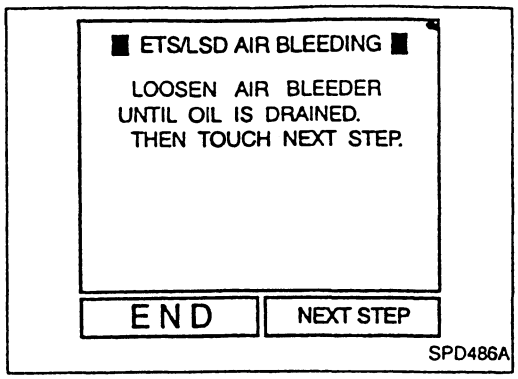
6. Touch "START".



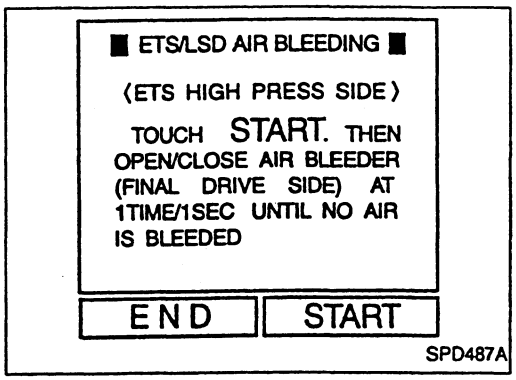
7. Pour oil into reservoir tank until oil level is approx. 30 mm above MAX line. Touch "NEXT".

CAUTION:
Always use genuine Nissan Power Steering Fluid Special in reservoir tank. When replenishing oil, be careful not to spill it into trunk room.

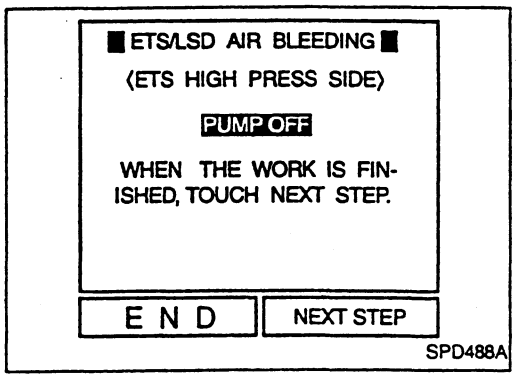
Air Bleeding (Cont'd)



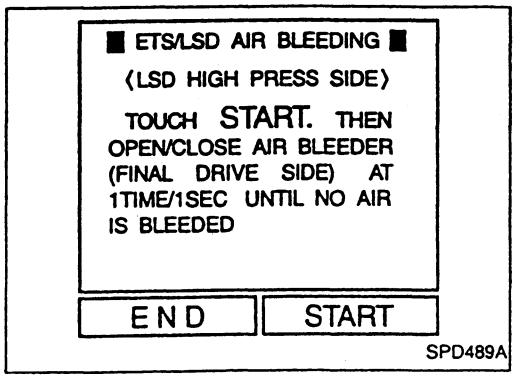
8. Open ATTESA E-TS PRO actuator air bleeder and bleed air from suction line (reservoir tank-to-ATTESA E-TS PRO actuator). Then tighten air bleeder to specified torque.
 Air bleeder tightening torque:
 : 5.9 - 7.8 N·m (0.6 - 0.8 kg-m)
9. Touch "NEXT STEP".



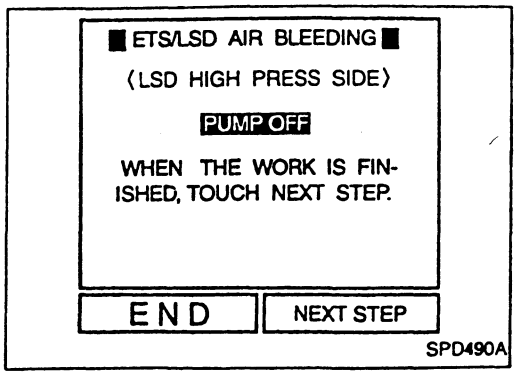
10. Touch "START". Bleed air from transfer actuator.



11. Tighten air bleeder to specified torque. Touch "NEXT STEP".
 Air bleeder tightening torque:
 : 5.9 - 9.8 N·m (0.6 - 1.0 kg-m)

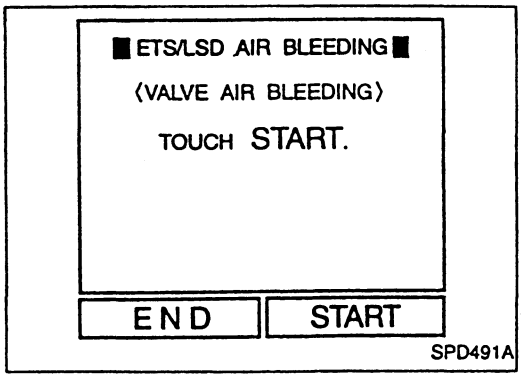


12. Touch "START". Bleed air from actuator on final drive side.

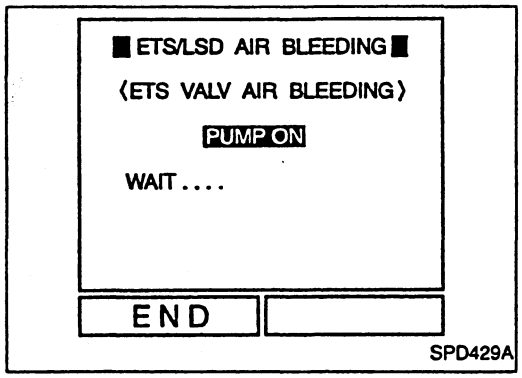


13. Tighten air bleeder to specified torque. Touch "NEXT STEP".
 Air bleeder tightening torque:
 : 5.9 - 9.8 N·m (0.6 - 1.0 kg-m)

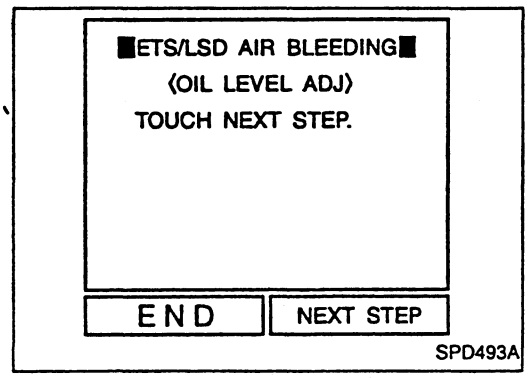
Air Bleeding (Cont'd)



14. Touch "START". Bleed air from reservoir tank return line.

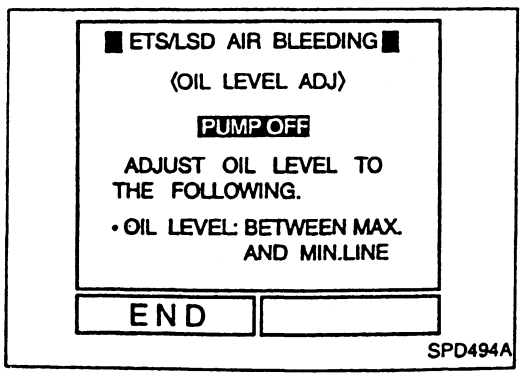


15. Touch "END".



16. Touch "NEXT STEP".

17. When "PUMP OFF" appears on display in place of "PUMP ON", check and correct oil level in reservoir tank.



18. Touch "END".

Air Bleeding (Cont'd)

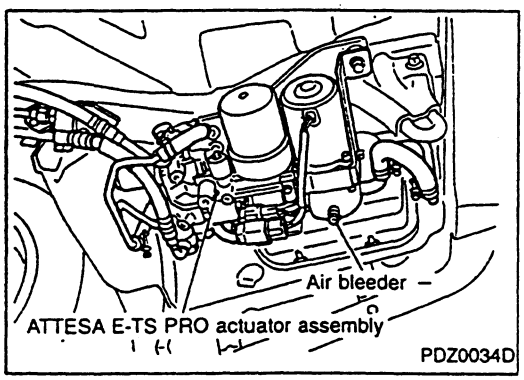
- **"STOP" may appear on display. This occurs when engine is started and vehicle is driven or when ATTESA E-TS PRO system malfunctions, during air bleeding procedures. When it appears, suspend air bleeding procedures and perform self-diagnostic procedures for ATTESA E-TS PRO system. Repair faulty areas.**
- **"EMERGENCY STOP" appears on display when ATTESA E-TS PRO system malfunctions and air bleeding operation is performed under a fail-safe condition. (When oil level is lower than specified level after new actuator assembly or pipes are installed, turning ignition switch ON may set ATTESA E-TS PRO/ABS system in a fail-safe condition.)**

WITHOUT CONSULT

1. Pour oil into reservoir tank until oil level is approx. 30 mm above MAX line.

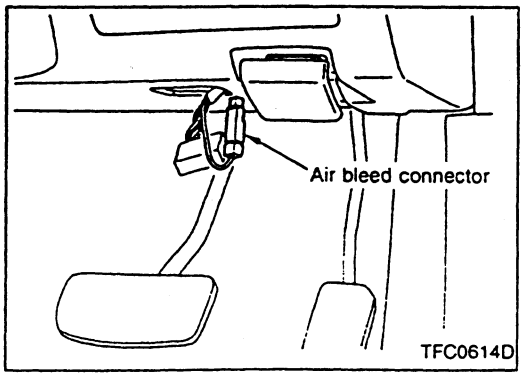
CAUTION:

- **Always use genuine Nissan Power Steering Fluid Special in reservoir tank. When replenishing oil, be careful not to spill it into trunk room.**

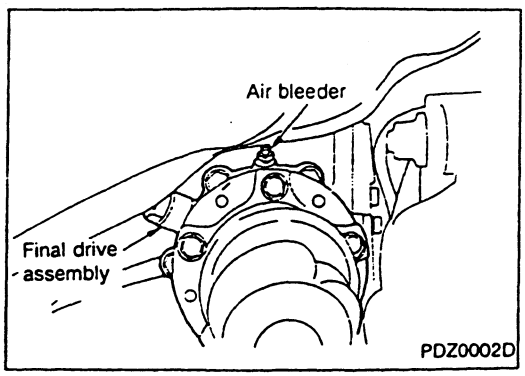


- **Before air bleeding procedures are performed, make sure that ignition switch is OFF.**

2. Open ATTESA E-TS PRO actuator air bleeder. Bleed air from suction line (reservoir tank-to-ATTESA E-TS PRO actuator) until air no longer is discharged from air bleeder opening. Close air bleeder and tighten it to specified torque.
 Air bleeder tightening torque:
 : 5.9 - 7.8 N·m (0.6 - 0.8 kg-m)
- When air bleeder is opened, oil inside suction line flows downward by gravity.



3. Turn ignition switch ON without starting engine.
4. Remove air bleed connector located at lower instrument panel on driver's side.
- When air bleed connector is removed, its wiring will be open and set in air bleed mode. At the same time, pump motor operates for several seconds and stops. Thus, a certain degree of oil pressure occurs on transfer actuator side.



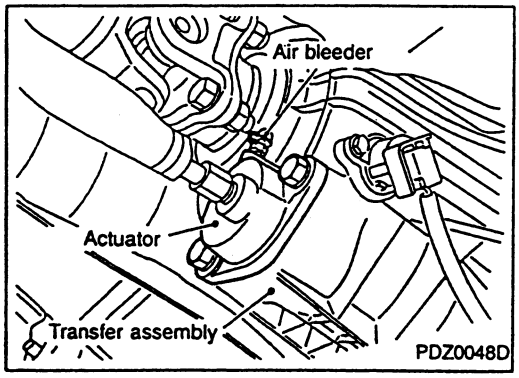
5. Open air bleeder on final drive actuator side and bleed air from actuator. Then tighten air bleeder to specified torque.
 Air bleeder tightening torque:
 : 5.9 - 9.8 N·m (0.6 - 1.0 kg-m)

CAUTION:

- **Be sure to open air bleeder when pump motor is inoperative. As soon as pump motor starts, close air bleeder.**
- **Do not operate pump motor for more than 10 seconds at a time.**
- **Make sure that hydraulic oil in reservoir tank is free from air sucking due to insufficient hydraulic oil quantity. If air sucking is noted, perform air bleeding procedures all over**

Air Bleeding (Cont'd)

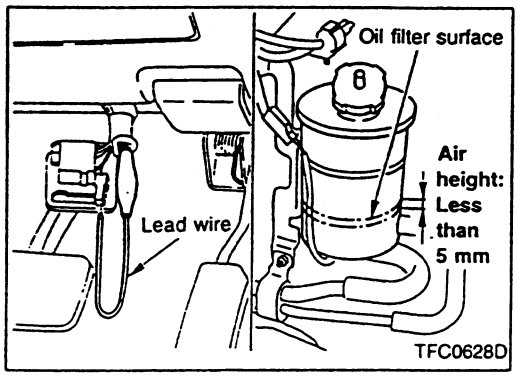
again.



6. Open air bleeder on transfer actuator side and bleed air from actuator. Then tighten air bleeder to specified torque.
 Air bleeder tightening torque:
 : 5.9 - 9.8 N·m (0.6 - 1.0 kg-m)

CAUTION:

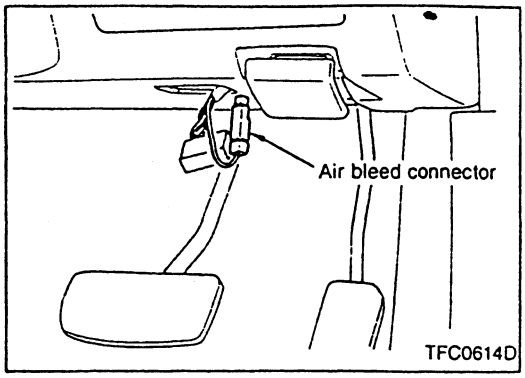
- **Be sure to open air bleeder when pump motor is inoperative. As soon as pump motor starts, close air bleeder.**
- **Do not operate pump motor for more than 10 seconds at a time.**
- **Make sure that hydraulic oil in reservoir tank is free from air sucking due to insufficient hydraulic oil quantity. If air sucking is noted, perform air bleeding procedures all over again.**

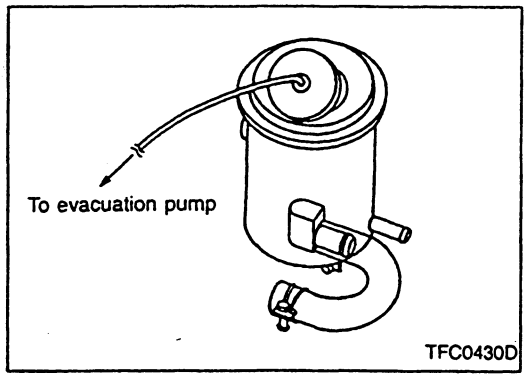


7. Connect and disconnect the wire lead to and from air bleed connector intermittently in response to ON-OFF operation of motor pump in order to bleed air from reservoir tank return line. Refer to the figure at left as a guide for air volume to be bled.

CAUTION:
Do not operate pump motor for more than 10 seconds at a time.

8. Replace air bleed connector in its original position and check oil level in reservoir tank.





Evacuation

After replacing actuator assembly, pipes, etc. with new ones, abnormal noise may be emitted at or around actuator when engine is started. When it occurs, evacuate actuator and hydraulic line so that air is completely expelled from these parts.

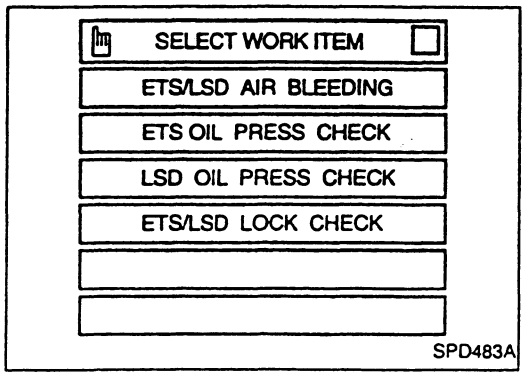
1. Make sure that pipe connections are tight, and that reservoir tank oil level is correct.
2. Remove air bleed connector and turn ignition switch ON. Within 10 seconds after ignition switch has been turned ON, depress brake pedal 5 times to set vehicle in 2WD mode. At this point, make sure that 4WD warning lamp and A-LSD warning lamp blink 2 times per second.
3. Remove cover from reservoir tank cap. Connect a vacuum hose or air conditioner evacuation pump to reservoir tank cap. Evacuate reservoir tank at a vacuum pressure of more than –96 kPa (720 mmHg) for at least 10 minutes.

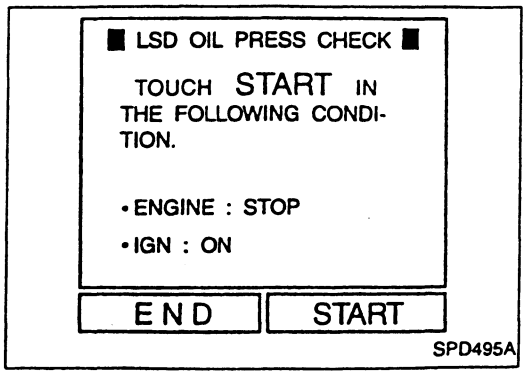
- Use a gauge manifold to check vacuum pressure discharged.

CAUTION:

- **Completely clean vacuum hose to be used for evacuating reservoir tank since it may have been used with different types of oil. Failure to follow this instruction results in oil leakage.**
- **Upon completion of evacuation procedures, completely wipe clean traces of oil from cap surface.**

4. Connect air bleed connector in its original position. Return vehicle operation from 2WD mode to 4WD mode. Check and correct reservoir tank oil level. Turn ignition switch OFF.



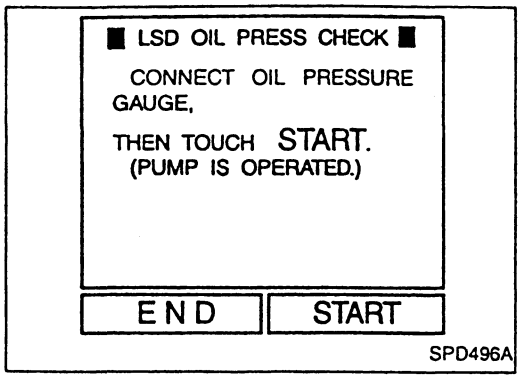


Oil Pressure Inspection

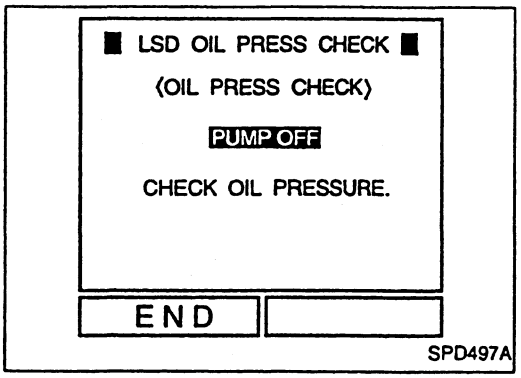
WITH CONSULT

1. Turn ignition switch OFF.
2. Connect CONSULT to data link connector.
3. Turn ignition switch ON.
4. Touch "START", "ABS" and "WORK SUPPORT" on CONSULT.
5. Touch "LSD OIL PRESS CHECK".
6. Touch "START".

Oil Pressure Inspection (Cont'd)

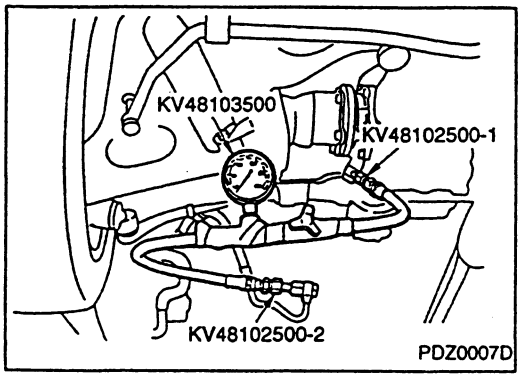


7. Set oil pressure gauge in position on vehicle. Bleed air from hydraulic oil line.
8. Touch "START".



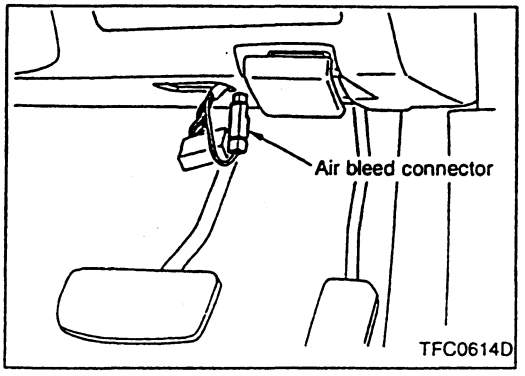
9. Check oil pressure.
 Oil pressure:
 Approx. 0.30 - 0.49 MPa (3.0 - 5.0 kg/cm²)
10. Touch "END".

CAUTION:
Upon completion of oil pressure inspection, bleed air from hydraulic circuit.



WITHOUT CONSULT

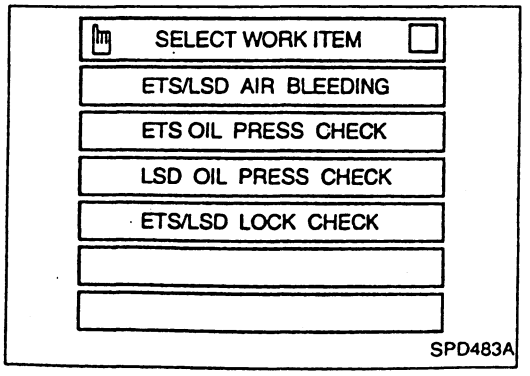
1. Raise vehicle off the ground. Install an oil pressure gauge (special service tool) in line between ATTESA E-TS PRO actuator and final drive actuator, then open valve.
2. Bleed air from hydraulic circuit.



3. Turn ignition switch ON without starting engine.
4. Remove air bleed connector and check oil pressure when ATTESA E-TS PRO actuator motor operates.
 Oil pressure:
 Approx. 0.30 - 0.49 MPa (3.0 - 5.0 kg/cm²)

CAUTION:
Do not operate actuator motor for more than 10 seconds at a time.

5. Remove oil pressure gauge and bleed air from hydraulic circuit.

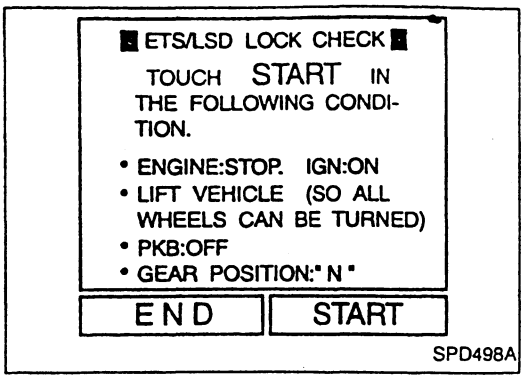


ATTESA E-TS PRO Lock Inspection

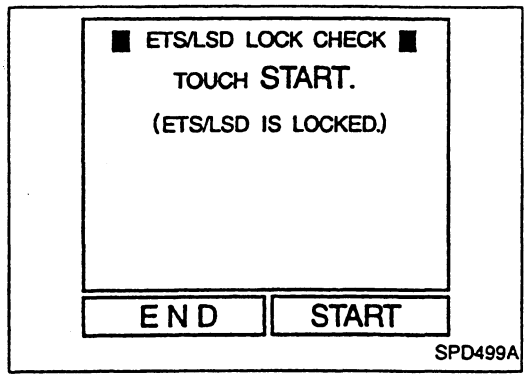
WITH CONSULT

1. Turn ignition switch OFF.
2. Connect CONSULT to data link connector.
3. Turn ignition switch ON.
4. Touch "START", "ABS" and "WORK SUPPORT" on CONSULT.
5. Touch "ETS/LSD LOCK CHECK".

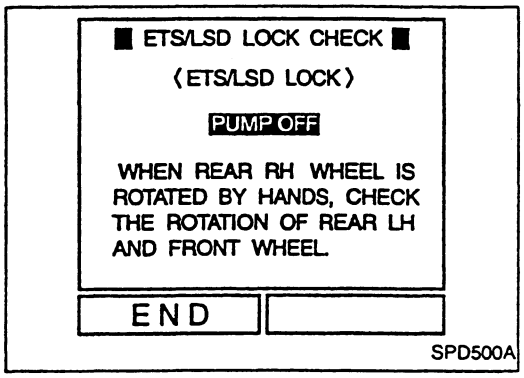
ATTESA E-TS PRO Lock Inspection (Cont'd)



6. Raise four wheels off the ground using garage jacks.
7. Move shift lever to Neutral, then release parking brake.
8. Touch "START".



9. Touch "START".

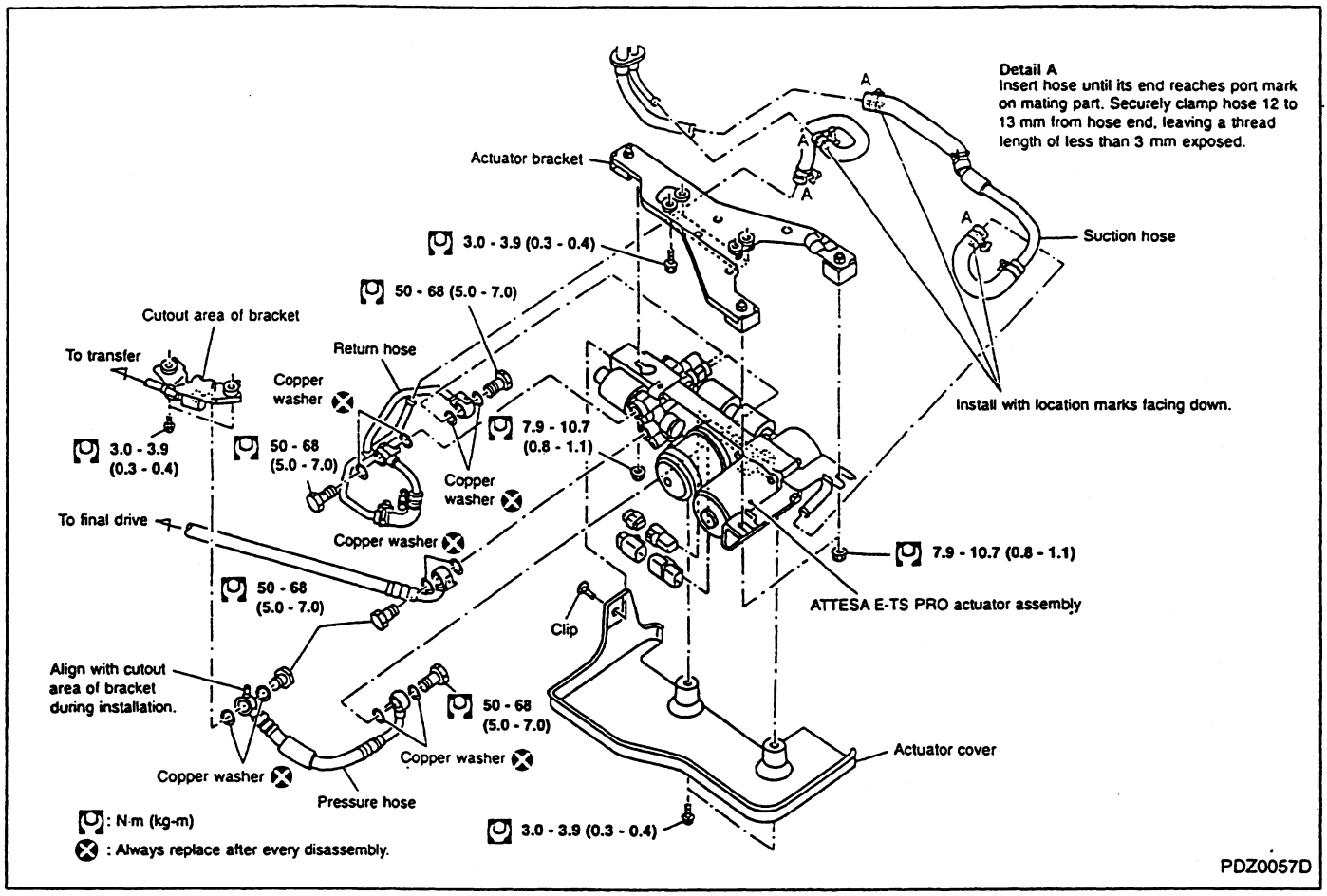


10. Slowly turn right rear wheel by hand to make sure that left rear and front wheels also turn.
11. Upon completion of inspection procedures, touch "END".

WITHOUT CONSULT

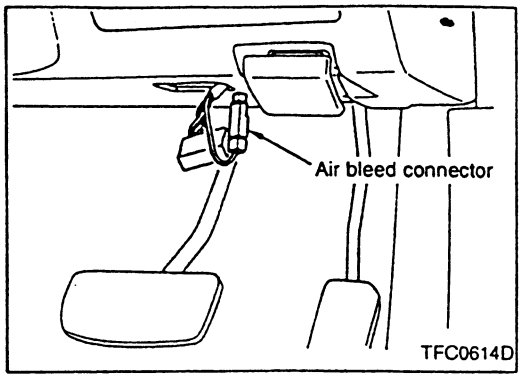
1. Turn ignition switch OFF.
2. Raise four wheels off the ground using garage jacks.
3. Move shift lever to Neutral, then release parking brake.
4. Turn ignition switch ON without starting engine. Remove air bleed connector and operate ATTESA E-TS PRO actuator.
5. Slowly turn right rear wheel by hand to make sure left rear and front wheels also turn.
6. Connect air bleed connector in its original position.

ATTESA E-TS PRO Actuator



CAUTION:

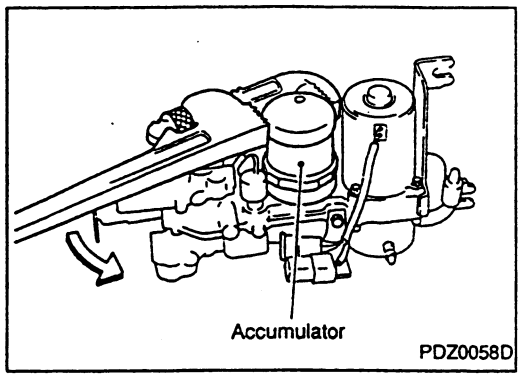
- **Always replace copper washers with new ones after every disassembly.**
- **When removing and installing ATTESA E-TS PRO actuator, be especially careful not to allow foreign particles (dust, dirt, etc.) to enter actuator.**



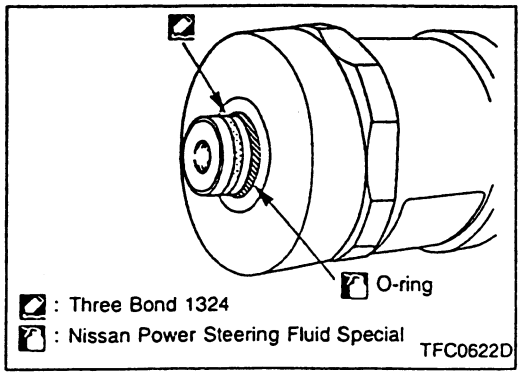
Accumulator

REMOVAL

1. Relieve oil pressure of hydraulic unit.
1) Turn ignition switch OFF.
2) Remove air bleed connector.
3) Remove motor relay connector.
4) Open air bleeders on transfer and final drive actuator sides.
5) Start engine.
6) After 4WD warning lamp and A-LSD warning lamp have been illuminated for 30 seconds, turn ignition switch OFF.
7) Repeat steps 5) and 6) until hydraulic oil no longer discharges from hydraulic unit.
8) Upon completion of hydraulic oil discharge procedures, start engine and turn ignition switch OFF.



2. Remove ATTESA E-TS PRO actuator.
3. Using pipe wrench, remove accumulator from ATTESA E-TS PRO actuator.

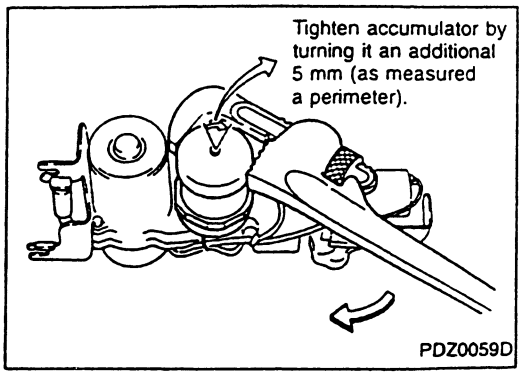


INSTALLATION

1. With accumulator mating surface of ATTESA E-TS PRO actuator facing down, remove traces of old Lock Tite.

CAUTION:
Be especially careful not to allow Lock Tite to enter oil line.

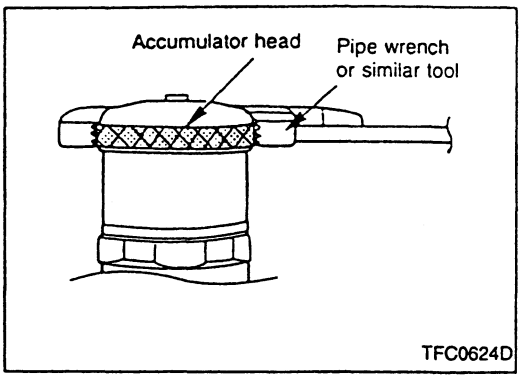
2. Apply a coat of Lock Tite (Three Bond 1324) to center of accumulator threads.
3. Apply a coat of Nissan Power Steering Fluid Special to the entire perimeter of O-ring.



4. Attach accumulator to ATTESA E-TS PRO actuator and manually screw it into actuator completely. Using pipe wrench, tighten accumulator by turning it an additional 5 mm (as measured perimeter).

Tightening torque (reference):
: 40 - 41 N·m (4.0 - 4.2 kg-m)

Accumulator (Cont'd)



TFC0624D

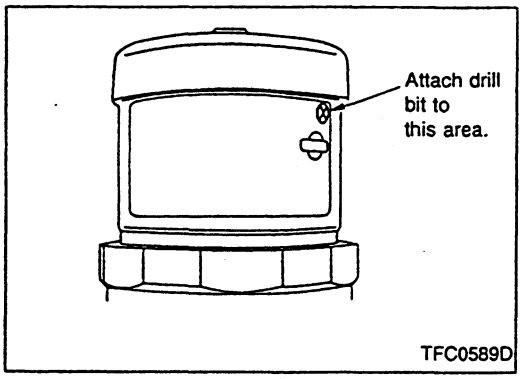
CAUTION:

- **If accumulator is accidentally scratched, repair it by applying a coat of black paint to that area.**
- **Attach pipe wrench to accumulator head as shown in the figure at left.**

5. Install ATTESA E-TS PRO actuator.

CAUTION:

Upon completion of installation procedures, be sure to bleed air from hydraulic circuit.



TFC0589D

DISPOSAL PROCEDURES

Observe the instructions indicated on caution label on accumulator before disposing of accumulator. Drill a hole on accumulator as shown in the figure at left to completely expel gaseous nitrogen from accumulator.

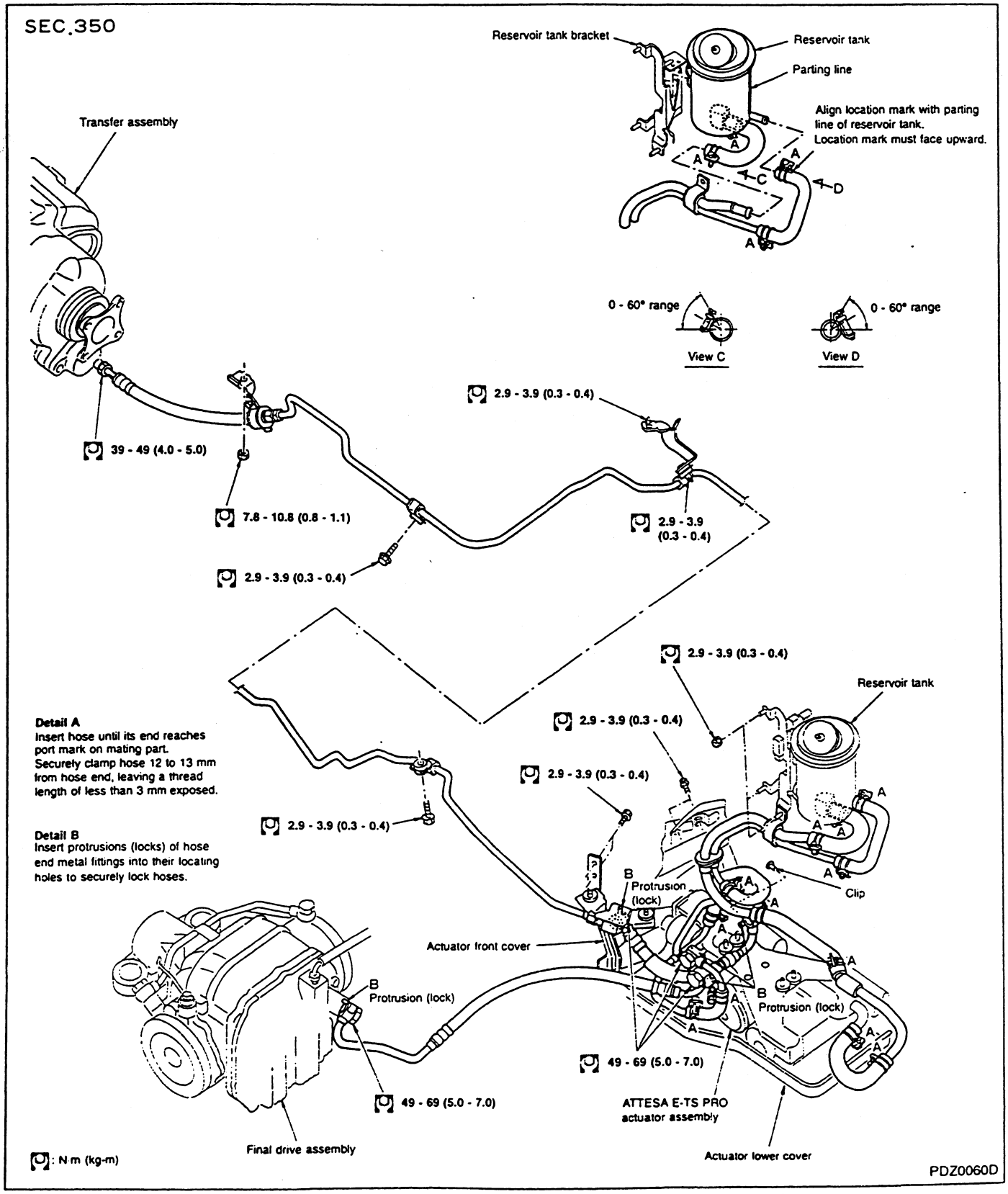
CAUTION:

- **Accumulator is charged with high-pressure gaseous nitrogen. Under no circumstances should accumulator be disassembled or fused using a welding tool.**
- **Wear goggles before drilling a hole on accumulator.**
- **Be sure to drill as small a hole as possible so that internal pressure can be gradually expelled from accumulator.**

Hydraulic Lines

CAUTION:

- **Always replace copper washers with new ones after every disassembly.**
- **When removing and installing piping, hoses, etc., be especially careful not to allow foreign particles (dust, dirt, etc.) to enter hydraulic lines.**



BRAKE SYSTEM

SECTION BR

MODIFICATION NOTICE:

- GT-R model has been introduced.
- ATTESA E-TS system has been added for model with GT-R.
- ATTESA E-TS PRO system has been added for model with GT-R V spec.

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E-TS/ABS SYSTEM 31
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Description

The ATTESA E-TS PRO consists of an E-TS system, A-LSD system and ABS system.
These 3 systems are operated by a single control unit (ATTESA E-TS PRO control unit). Signals from multiple sensors are received and acted upon to provide a comprehensive control system.
In the event of an ATTESA E-TS PRO electrical system failure, the 4WD warning lamp, A-LSD warning lamp and ABS warning lamp (all located in the combination meter cluster) will illuminate either separately or simultaneously to inform the driver of a problem. Self-diagnosis begins immediately and the results (problem areas) appear according to the ABS warning lamp ON-OFF count.
Refer to the Table below if the electrical system diagnostic tester (CONSULT) is used to troubleshoot the problem.

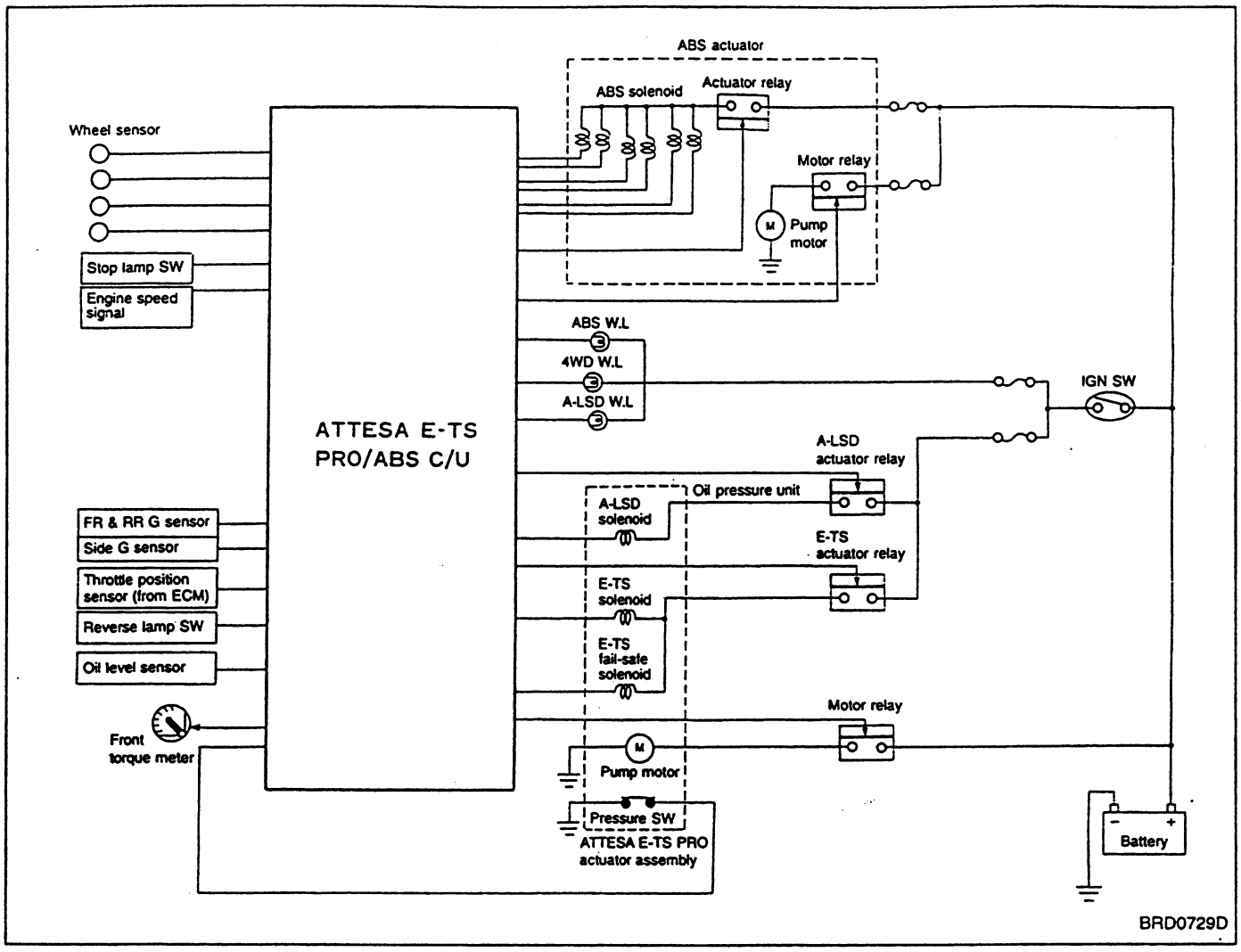
Diagnostic test mode	Remarks
Work support	ETS/LSD air bleeding, ETS/LSD oil pressure check, ETS/LSD lock inspection
Self-diagnostic results	Compatible with ATTESA E-TS PRO/ABS
Data monitor	Compatible with ATTESA E-TS PRO/ABS
Active test	ABS solenoid valve ON-OFF and ABS monitor ON-OFF
ECM part number	ATTESA E-TS PRO/ABS control unit

Fail-Safe Function

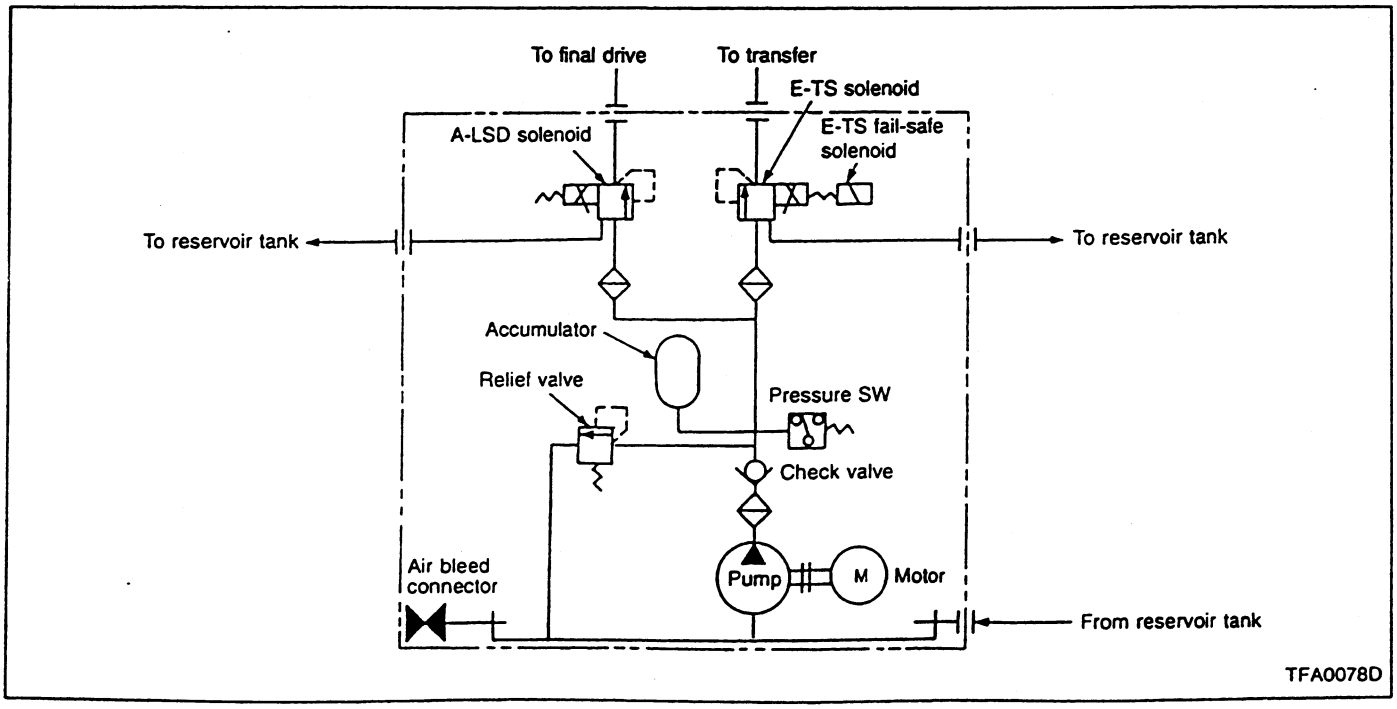
If a malfunction occurs in the ATTESA E-TS PRO system, the 4WD warning lamp, A-LSD waning lamp and ABS warning lamp (all located in the combination meter cluster) will illuminate simultaneously. If only the A-LSD warning lamp illuminates, there is no differential limitation. The E-TS and ABS systems operate normally to provide normal final drive conditions and control. If the 4WD warning lamp and A-LSD warning lamp illuminate simultaneously, decreased 4WD conditions prevail with the ABS system operating normally. If only the ABS warning lamp illuminates, the ABS system will not function. Brakes operate as they would on a vehicle without ABS. The E-TS and A-LSD systems operate normally.
When all 3 lamps are simultaneously illuminated, decreased 4WD conditions prevail. Differential limitation control does not occur. Final drive conditions are normal. The ABS system is not functioning. Brakes operate as they would on a vehicle without ABS.

- **If a malfunction occurs in the control unit and/or the wheel sensor circuit, the 4WD warning lamp, A-LSD warning lamp and ABS warning lamp will illuminate simultaneously.**

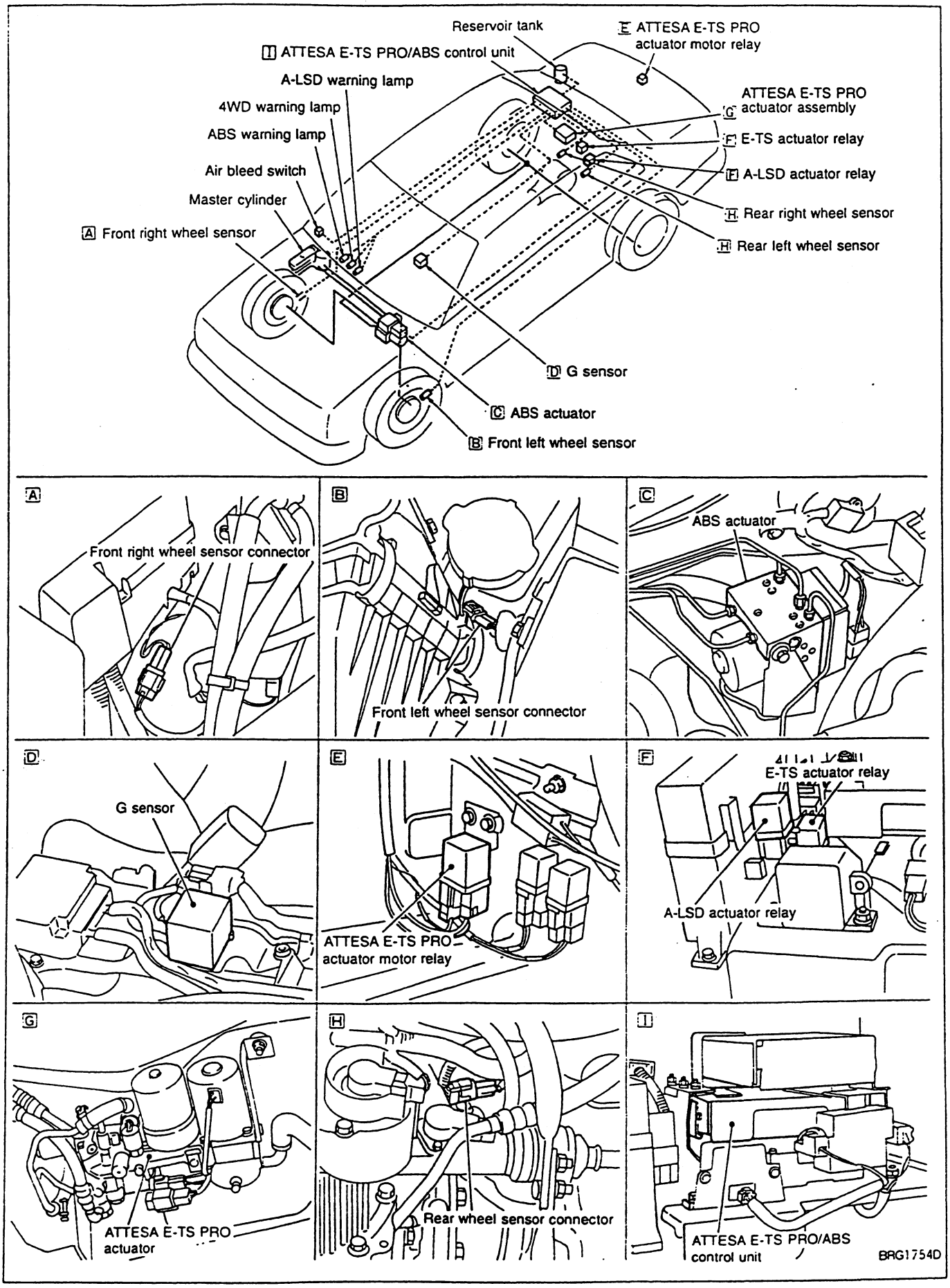
System Diagram



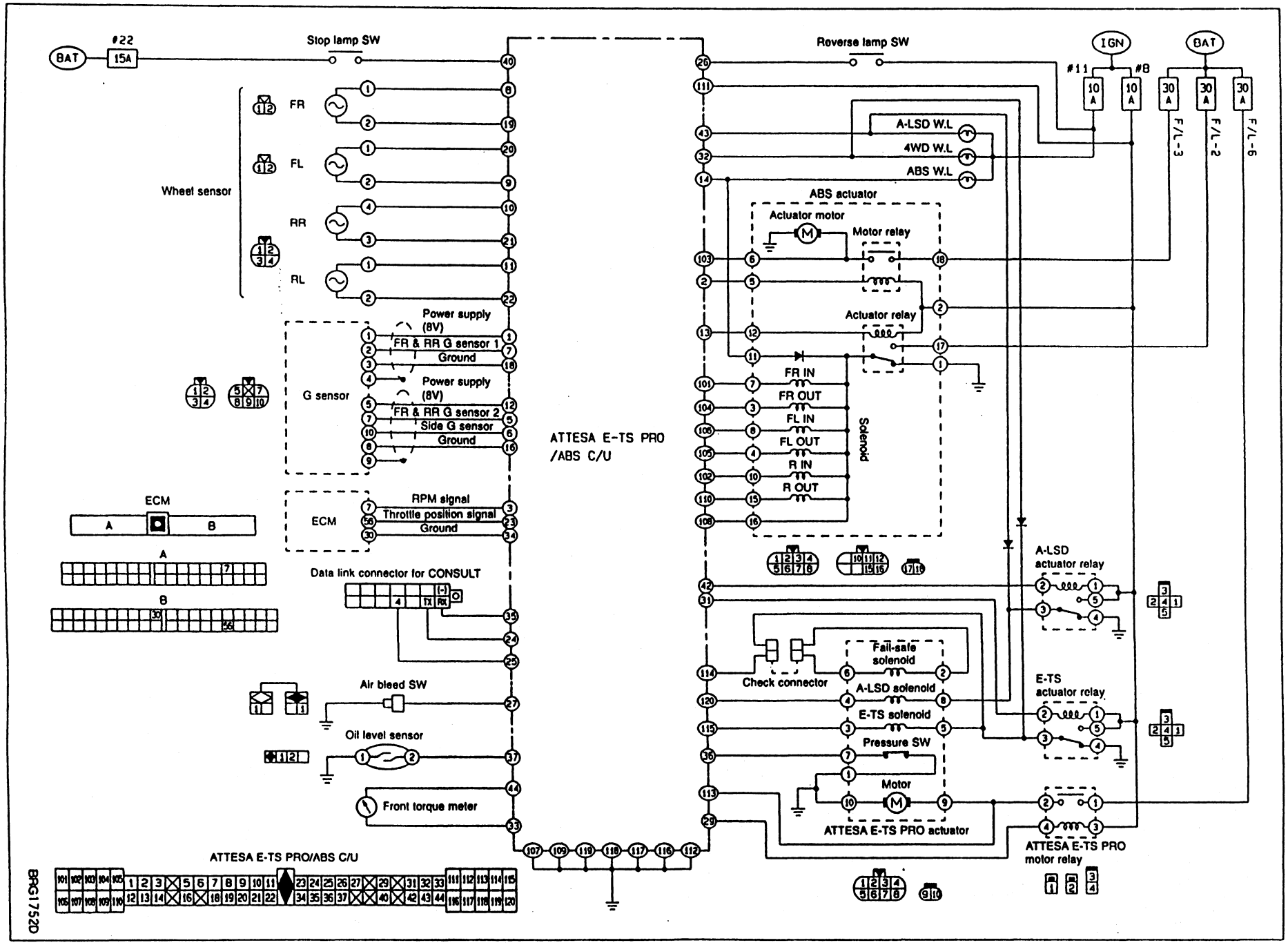
Hydraulic Circuit Diagram



Component Parts Location



Circuit Diagram



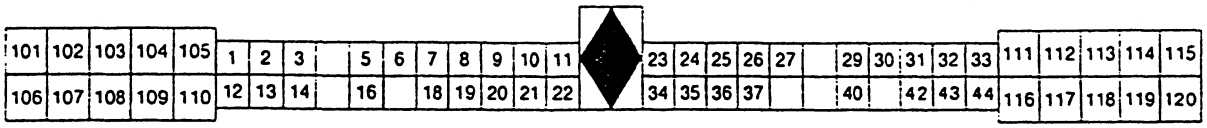
Control Unit Input/Output Signal Specifications

USING CIRCUIT TESTER

E-TS/ABS control unit

To perform the following inspection switch should be turned ON with ABS control unit connector and actuator connector properly connected.

ATTESA E-TS PRO/ABS control unit connector



BRG1755D

Terminal No. +	Terminal No. −	Item	Specifications*1		Check item (Reference)
101	Body ground	Front right wheel IN solenoid	Actuator operating (with CONSULT set in active test mode) or actuator relay not operating. (Fail-safe system operating or before engine starting, etc.)	Approx. 0V	ABS solenoid and circuit
104		Front right wheel OUT solenoid			
106		Front left wheel IN solenoid			
105		Front left wheel OUT solenoid	Actuator not operating and actuator relay operating (Engine operating and vehicle at rest)	Power supply voltage (approx. 12V)	
102		Rear wheel IN solenoid			
110		Rear wheel OUT solenoid			
103		ABS motor monitor	ABS motor operating (CONSULT set in active test mode)	Power supply voltage (approx. 12V)	ABS motor monitor circuit
			ABS motor not operating (ignition switch turned ON)	Approx. 0V	
107 109 112 116 117 118 119		Ground	—		Control unit ground circuit
108		ABS actuator relay monitor	Actuator relay operating (Engine operating)	Power supply voltage (approx. 12V)	ABS warning lamp and circuit; ABS actuator relay monitor circuit
			Actuator relay not operating (Fail-safe system operating and before engine starts)	Approx. 0V	
111		Battery	Ignition switch ON	Power supply voltage (approx. 12V)	Control unit power supply circuit
113	Body ground	ETS motor monitor	Actuator motor operating	Power supply voltage (approx. 12V)	E-TS motor, motor relay and circuits
			Actuator motor not operating	Approx. 0V	

Control Unit Input/Output Signal Specifications (Cont'd)

Terminal No. +	Terminal No. −	Item	Specifications*1		Check item (Reference)
114	Body ground	Fail-safe solenoid	Engine operating	Approx. 2V or less	Fail-safe solenoid and circuit
115		ETS solenoid	Vehicle at rest with engine at idle	Power supply voltage (approx. 12V)	E-TS actuator relay, solenoid and circuits
120		LSD solenoid	Vehicle at rest with engine at idle	Power supply voltage (approx. 12V)	A-LSD actuator relay, solenoid and circuits
1	18	G sensor power supply 1	Ignition switch ON (vehicle at rest on flat surface)	Approx. 8V (for reference)	G sensor and circuit
2	Body ground	ABS motor relay	ABS motor operating (CONSULT set in active test mode)	Approx. 2V or less	ABS motor, motor relay and circuits
			ABS motor not operating (ignition switch ON)	Power supply voltage (approx. 12V)	
5, 6	16	FR & RR G sensor 2, Side G sensor	Ignition switch ON (with vehicle at rest on flat surface)	Approx. 2.5V (Reference)	G sensor and circuit
7	18	FR & RR G sensor 1	Ignition switch ON (with vehicle at rest on flat surface)	Approx. 2.5V (Reference)	G sensor and circuit
8	19	Front right wheel sensor	Vehicle operating at approx. 30 km/h*4	Pulse signal emitted at 200 Hz per second	Wheel sensor and circuit
10	21	Rear right wheel sensor			
12	16	G sensor power supply 2	Ignition switch ON (with vehicle at rest on flat surface)	Approx. 8V (Reference)	G sensor and circuit
13	Body ground	ABS actuator relay	Actuator relay operating (Engine operating)	Less than approx. 2V	ABS actuator relay and circuit
			Actuator relay not operating (Fail-safe system operating and before engine starting)	Battery voltage (approx. 12V)	
14		ABS warning lamp*3	ABS warning lamp ON	Approx. 0V	ABS warning lamp and circuit
			ABS warning lamp OFF	Battery voltage (approx. 12V)	
20	9	Front left wheel sensor	Vehicle operating at approx. 30 km/h*4	Pulse signal emitted at 200 Hz per second	Wheel sensor and circuit
22	11	Rear left wheel sensor			
23	Body ground	Throttle position sensor	Accelerator pedal fully depressed	Approx. 4.0V	Throttle position sensor and circuit
			Accelerator pedal fully released	Approx. 0.5V	
26		Reverse lamp signal	Vehicle moving backward	Battery voltage (approx. 12V)	Reverse lamp and circuit
			Vehicle moving forward or turning	Approx. 0V	
29		E-TS MOTOR RELAY	Ignition switch ON	Battery voltage (approx. 12V)	E-TS motor, motor relay and circuits
31		E-TS actuator relay	Vehicle at rest with engine at idle	Less than approx. 2V	E-TS actuator relay and circuit
32		4WD warning lamp*2	4WD warning lamp ON	Approx. 0V	4WD warning lamp and circuit
			4WD warning lamp OFF	Battery voltage (approx. 12V)	

Control Unit Input/Output Signal Specifications (Cont'd)

Terminal No. +	Terminal No. −	Item	Specifications*1		Check item (Reference)
33	44	Front torque meter	Torque meter indications 0 kg-m	Approx. 0.6V	Front torque meter
			30 kg-m	Approx. 3.5V	
36	Body ground	Oil pressure unit pressure switch	E-TS motor not operating	Approx. 5V	Pressure switch and circuit
			E-TS motor operating	Approx. 0V	
40		Stop lamp signal	Brake pedal depressed	Battery voltage (approx. 12V)	Stop lamp switch and circuit
			Brake pedal released	Approx. 0V	
42		A-LSD actuator relay	Vehicle at rest with engine at idle	Less than approx. 2V	A-LSD actuator relay and circuit
43		LSD warning lamp	LSD warning lamp ON	Approx. 0V	A-LSD warning lamp and circuit
			LSD warning lamp OFF	Battery voltage (approx. 12V)	

*1: Do not forcefully expand connector terminals to check voltage using circuit tester or voltmeter.
*2: 4WD warning lamp ON-OFF timing
ON: Ignition switch ON (before engine starts) or abnormalities detected.
OFF: After engine starts (with system operating in normal condition)
*3: ABS warning lamp ON-OFF timing
ON: Ignition switch ON (before engine starts) or abnormalities detected
OFF: After engine starts (with system operating in normal condition)
*4: Make sure that tires are inflated to specified pressure.
*5: LSD warning lamp ON-OFF timing
ON: Ignition switch ON (before engine starts) or abnormalities detected
OFF: After engine starts (with system operating in normal condition)

Control Unit Input/Output Signal Specifications (Cont'd)

USING CONSULT

Indicated are the control unit computed data. If the output circuit (harness) should be open or short-circuited, correct values may be displayed.

Display	Monitor item	Data monitor			Check item (reference)
		Condition		Specifications	
WHEEL SENSOR [km/h]	Wheel speed	Vehicle at rest		0 km/h	Wheel sensor system and circuit
		Vehicle operating*1		Identical to speedometer indication	
FF & RR G-SENSOR 1 [G]	G sensor operating condition	Vehicle at rest on flat surface		Within ±0.15G	FR & RR G sensors and circuits
FF & RR G-SENSOR 2 [G]					
SIDE G-SENSOR [G]				R or L: 0.5G or less	Side G sensor and circuit
THRTL POS SEN [V]	Throttle positioning condition	Accelerator pedal fully released		Approx. 0.5V	Throttle position sensor and circuit
		Accelerator pedal fully depressed		Approx. 4.0V	
STOP LAMP SW [ON-OFF]	Brake pedal operating condition	Brake pedal depressed		ON	Stop lamp and circuit
		Brake pedal released		OFF	
ENG RPM SIGNAL [STOP-RUN]	Engine operating condition	Engine operating at a speed of less than 400 rpm		STOP	Engine speed signal circuit
		Engine operating at a speed of 400 rpm or above		RUN	
PRESSURE SW [ON-OFF]	Pressure switch operating condition	ATTESA E-TS PRO actuator motor operating		ON	Pressure switch and circuit
		ATTESA E-TS PRO actuator motor not operating		OFF	
AIR BLEED SW [ON-OFF]	Air bleed switch ON-OFF condition	Ignition switch ON	Air bleed switch removed	ON	Air bleed switch and circuit
			Air bleed switch installed	OFF	
OIL LEVEL SW [ON-OFF]	Oil level switch ON-OFF condition	ATTESA E-TS PRO hydraulic oil	Oil level within specified range	ON	Oil level switch and circuit
			Oil level too low	OFF	
OUT ABS SOLENOID [ON-OFF]	Solenoid operating condition	Actuator (solenoid) operating with (CONSULT set in active test mode) or actuator relay not operating (fail-safe system operating and before engine starts)		ON	ABS solenoid and circuit
IN ABS SOLENOID [ON-OFF]		Actuator (solenoid) not operating and actuator relay operating (with engine operating and with vehicle at rest)		OFF	
ETS SOLENOID [A]	E-TS solenoid operating condition	Vehicle at rest	Ignition switch ON	Approx. 0A	E-TS actuator relay solenoid and circuit
			Engine at idle	Approx. 0.2A	
LSD SOLENOID [A]	A-LSD solenoid operating condition	Vehicle at rest	Ignition switch ON	0A	A-LSD actuator relay solenoid and circuit
			Engine at idle	Approx. 0.2A	

Control Unit Input/Output Signal Specifications (Cont'd)

Display	Monitor item	Data monitor			Check item (reference)
		Condition		Specifications	
ETS F/S VALVE [A]	E-TS fail-safe solenoid operating condition	Vehicle at rest	Ignition switch ON	0A	E-TS fail-safe solenoid and circuit
			Engine at idle	Approx. 0.7A	
ABS ACTUATOR RELAY [ON-OFF]	Actuator relay operating condition	Vehicle at rest	Ignition switch ON	OFF	ABS actuator relay and circuit
			Engine operating	ON	
ABS MOTOR RELAY [ON-OFF]	Motor and motor relay operating condition	Ignition switch ON or engine operating	ABS not operating	OFF	ABS motor, motor relay and circuits
			ABS operating	ON	
ETS/LSD MOTOR [ON-OFF]	ATTESA E-TS PRO actuator operating condition	ATTESA E-TS PRO actuator motor not operating		OFF	ATTESA E-TS PRO actuator motor relay and circuit
		ATTESA E-TS PRO actuator motor operating		ON	
ETS/LSD RELAY [ON-OFF]	ATTESA E-TS PRO actuator relay operating condition	ATTESA E-TS PRO actuator motor not operating		OFF	
		ATTESA E-TS PRO actuator motor operating		ON	
ETS ACTUATOR [ON-OFF]	E-TS actuator relay operating condition	Ignition switch ON and engine not operating		OFF	E-TS actuator relay and circuit
		Engine operating		ON	
WARNING LAMP [ON-OFF]	ABS warning lamp ON operation*2	ABS warning lamp ON		ON	ABS warning lamp
		ABS warning lamp OFF		OFF	
G-SEN VOLT 1 [V] G-SEN VOLT 2 [V]	Battery voltage furnished to G sensor	Ignition switch ON		Approx. 8V (Reference)	G sensor power supply circuit
BATTERY VOLT [V]	Battery voltage furnished to control unit			Approx. 12V (Battery voltage)	Control unit power supply circuit

*1: Make sure that tires are inflated to specified pressure.
*2: ABS warning lamp ON-OFF timing:
ON: Ignition switch ON (before engine starts) or abnormalities detected
OFF: After engine starts (system operating in normal condition)

Precautions for Trouble Diagnosis

- After performing trouble diagnosis, be sure to erase trouble stored in memory. Refer to "CONSULT" (next page) or "SELF-DIAGNOSIS" (BR-21).
- As for the concerns that are difficult to duplicate, move harnesses or harness connectors by hand to check if there is any poor mating of connector halves or faulty connection.
- Do not force to open a connector terminal when using a circuit tester for inspection.
- Read GI section thoroughly in advance and make sure of all the general precautions.

Basic Inspection

BASIC INSPECTION 1 — Brake fluid level and leakage

1. Check brake fluid level in reservoir tank. Replenish brake fluid if necessary.
2. Check for leakage at or around brake piping and ABS actuator. If leakage or seepage is noted, proceed as follows:

- If ABS actuator connectors are loose, tighten to specified torque. Recheck to ensure that leakage is no longer present.
- If flare nut threads at piping connectors or actuator threads are damaged, replace faulty parts with new ones. Recheck to ensure that leakage is no longer present.
- If brake fluid leaks through areas other than actuator connectors, wipe off using a clean cloth. Recheck for leakage or seepage. If necessary, replace faulty parts with new ones.
- If brake fluid leaks at or seeps through ABS actuator, wipe off using a clean cloth. Recheck for leakage or seepage. If necessary, replace ABS actuator with new one.
- Make sure that oil level (ATTESA E-TS PRO system) and oil pressure are correct, Also check that system is free from oil leakage and abnormalities.

CAUTION:
ABS actuator cannot be disassembled. Do not attempt to disassemble it.

- Make sure that battery cables are securely connected to their terminals (positive and ground), and that battery case grounding is tight. If necessary, tighten to specified torque. Check that battery voltage is not lower than specifications.

BASIC INSPECTION 2 — Loose power line terminal

Check battery terminals (positive and negative) and battery mounting (ground) for looseness.

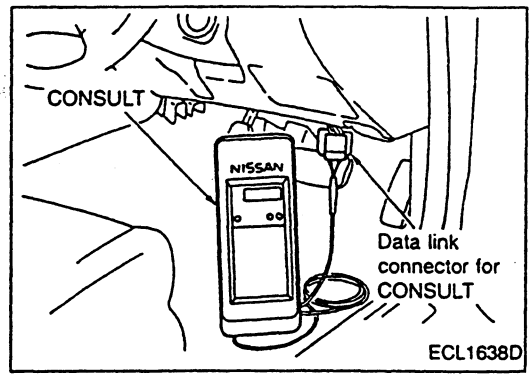
BASIC INSPECTION 3 — ABS warning lamp

1. Turn ignition switch "ON" to ensure that ABS warning lamp lights up. If ABS warning lamp does not light, check ABS warning lamp circuit.
2. Make sure that A-LSD warning lamp illuminates when ignition switch is turned ON. If it does not illuminate, Check A-LSD warning lamp and related circuit.
3. Make sure that 4WD warning lamp illuminates when ignition switch is turned ON. If it does not illuminate, Check 4WD warning lamp and related circuit.
4. Make sure that the 4WD, A-LSP and ABS warning lamps go out approximately 1 second after engine has started. If any of the warning lamps do not go out, perform self-diagnostic procedures for related system(s).
5. After driving vehicle at approx. 30 km/h for approx. 1 minute, check to ensure that 4WD warning lamp, A-LSD warning lamp and ABS warning lamp remain off. If ABS warning lamp lights, perform self-diagnosis procedures.
6. After performing self-diagnosis procedures, be sure to erase trouble stored in memory.

CONSULT

CONTROL UNIT PART NUMBER

The part number that is shown on the control unit label and CONSULT: 47850 AA410



SELF-DIAGNOSIS PROCEDURE

1. Collect information on the concern from the customer, and then perform basic inspections.
2. Turn ignition switch OFF and connect CONSULT connector to data link connector for CONSULT on the vehicle.
3. Start engine and drive vehicle at approx. 30 km/h for approx. 1 minute.
4. Stop vehicle and touch "START", "ABS" and "SELF-DIAG RESULTS" sequentially on the CONSULT screen with engine running.

- **If "START" is touched immediately after engine is started or ignition switch is turned on, "ABS" may not be displayed on "SELECT SYSTEM" screen. To display "ABS", repeat the self-diagnosis procedure from the beginning.**

5. Self-diagnosis results are displayed on the screen. (Touch "PRINT" to print out the self-diagnosis results, if necessary.)

- If "NO FAIL" is displayed, inspect 4WD, A-LSD and ABS warning lamps. Refer to the previous page.

6. Perform appropriate inspection from the self-diagnostic results mode and repair or replace faulty parts.
7. Start engine and drive vehicle at approx. 30 km/h for approx. 1 minute.

- **Recheck to ensure that there is no other malfunction.**

8. Turn ignition switch OFF to prepare for erasing the trouble stored in memory.
9. Start engine and touch "START", "ABS", "SELF-DIAG RESULTS" and "ERASE" sequentially on the CONSULT screen to erase the trouble stored in memory.

- **If the trouble stored in memory is not erased, repeat step 6.**

10. Drive vehicle at approx. 30 km/h for approx. 1 minute and then confirm that 4WD, A-LSD and ABS warning lamps are off.

CONSULT (Cont'd)

SELF-DIAGNOSTIC RESULTS MODE

Diagnostic item	Diagnostic item is detected when...	Check item
FR RH SENSOR [OPEN]	• Input terminal voltage is abnormally high. This occurs when front right wheel sensor circuit is open or signal power supply circuit is shorted.	Wheel sensor and circuit
FR LH SENSOR [OPEN]	• Input terminal voltage is abnormally high. This occurs when front left wheel sensor circuit is open or signal power supply circuit is shorted.	
RR RH SENSOR [OPEN]	• Input terminal voltage is abnormally high. This occurs when rear right wheel sensor circuit is open or signal power supply circuit is shorted.	
RR LH SENSOR [OPEN]	• Input terminal voltage is abnormally high. This occurs when rear left wheel sensor circuit is open or signal power supply circuit is shorted.	
FR RH SENSOR [SHORT]	• Input terminal voltage is abnormally low or input signal is incorrect. This occurs when front right wheel sensor circuit is shorted, signal circuit is shorted to ground or front right wheel sensor-to-rotor clearance is abnormally wide.	
FR LH SENSOR [SHORT]	• Input terminal voltage is abnormally low or input signal is incorrect. This occurs when front left wheel sensor circuit is shorted, signal circuit is shorted to ground or front left wheel sensor-to-rotor clearance is abnormally wide.	
RR RH SENSOR [SHORT]	• Input terminal voltage is abnormally low or input signal is incorrect. This occurs when rear right wheel sensor circuit is shorted, signal circuit is shorted to ground or rear right wheel sensor-to-rotor clearance is abnormally wide.	
RR LH SENSOR [SHORT]	• Input terminal voltage is abnormally low or input signal is incorrect. This occurs when rear left wheel sensor circuit is shorted, signal circuit is shorted to ground or wheel sensor-to-rotor clearance is abnormally wide.	
FR RH IN ABS SOL / FR RH OUT ABS SOL [OPEN]	• Output terminal voltage is abnormally lower than controlled value when either front right wheel ABS solenoid circuit is open or control circuit is shorted to ground.	ABS solenoid and circuit
FR LH IN ABS SOL / FR LH OUT ABS SOL [OPEN]	• Output terminal voltage is abnormally lower than controlled value when either front left wheel ABS solenoid circuit is open or control circuit is shorted to ground.	
REAR IN ABS SOL / REAR OUT ABS SOL [OPEN]	• Output terminal voltage is abnormally lower than controlled value when either rear wheel ABS solenoid circuit is open or control circuit is shorted to ground.	
FR RH IN ABS SOL / FR RH OUT ABS SOL [SHORT]	• Output terminal voltage is abnormally higher than controlled value when either front right wheel ABS solenoid circuit is shorted or control circuit is shorted to power supply circuit.	
FR LH IN ABS SOL / FR LH OUT ABS SOL [SHORT]	• Output terminal voltage is abnormally higher than controlled value when either front left wheel ABS solenoid circuit is shorted or control circuit is shorted to power supply circuit.	
REAR IN ABS SOL / REAR OUT ABS SOL [SHORT]	• Output terminal voltage is abnormally higher than controlled value when either rear wheel ABS solenoid circuit is shorted or control circuit is shorted to power supply circuit.	
ABS MOTOR [ON FAILURE]	• While ABS motor is being controlled to be set to OFF, it turns ON.	ABS motor, motor relay and circuit
ABS MOTOR [OFF FAILURE]	• While ABS motor is being controlled to be set to ON, it turns ON.	

CONSULT (Cont'd)

Diagnostic item	Diagnostic item is detected when...	Check item
ABS ACTUATOR RELAY [ON FAILURE]	• While ABS actuator relay is being controlled to set to OFF, it turns ON.	ABS actuator relay and circuit
ABS ACTUATOR RELAY [OFF FAILURE]	• While ABS actuator relay is being controlled to set to ON, it turns OFF.	
BATTERY VOLTAGE [VB-HIGH]	• ATTESA E-TS PRO/ABS control unit power supply voltage is abnormally high.	Control unit power supply circuit
BATTERY VOLTAGE [VB-LOW]	• ATTESA E-TS PRO/ABS control unit power supply voltage is abnormally low.	
FR & RR G-SEN 1 [ABNORMAL]	•FR & RR G sensor 1 output is abnormally higher or lower than specifications.	G sensor and circuit
FR & RR G-SEN 2 [ABNORMAL]	• FR & RR G sensor 2 output is abnormally higher than specifications.	G sensor and circuit
FR & RR G-SEN 1, 2 [ABNORMAL]	• Output voltage difference between FR & RR G sensors 1 and 2, which is abnormally higher than specified value, has continued for a certain period.	
G-SEN VOLT 1 [ABNORMAL]	• FR & RR G sensor 1 power supply voltage, which is abnormally higher than, or lower than specifications, has continued for a certain period of time.	
G-SEN VOLT 2 [ABNORMAL]	• FR & RR G sensor 2 power supply voltage, which is abnormally higher than, or lower than specifications, has continued for a certain period of time.	
SIDE G-SENSOR [ABNORMAL]	• Side G sensor output voltage, which is abnormally higher than, or lower than specifications, has continued for a certain period of time.	
AIR BLEED SW	• Air bleed switch has been turned ON for a certain period of time during vehicle operation.	Air bleed switch and circuit
THROTTLE POSI SEN	• Throttle position sensor signal voltage, which is 0V or abnormally higher than specifications, has continued for a certain period of time.	Throttle position sensor and circuit
OIL LEVEL SW	• Oil level switch has been turned OFF (oil level too low) for a certain period of time.	Oil level switch and circuit
PRESSURE SW [ON FAILURE]	• Pressure switch has been turned ON for an extended period of time.	Pressure switch and circuit
PRESSURE SW [OFF FAILURE]	• Pressure switch has been turned OFF for an extended period of time although current flows through E-TS solenoid or A-LSD solenoid. Or, it has been turned OFF only for a short period of time (due to pressure switch in dummy contact with other parts (dummy circuit setup) or gas pressure drop).	
ETS/LSD MOTOR [ON FAILURE]	• While ATTESA E-TS PRO actuator motor is being controlled to be set to OFF, actuator motor control terminal voltage does not become 0V (ground potential). (E-TS motor relay is ON all the time, motor circuit is open, etc.)	ATTESA E-TS PRO actuator motor and circuit
ETS/LSD MOTOR [OFF FAILURE]	• While ATTESA E-TS PRO actuator is being controlled to be set to ON, actuator motor control terminal voltage is not present.	
ETS SOLENOID [OPEN]	• Specified voltage is not applied to E-TS solenoid control terminal (open solenoid circuit, etc.).	E-TS relay, solenoid and circuits
ETS SOLENOID [SHORT]	• E-TS solenoid control terminal voltage is abnormal (shorted E-TS solenoid circuit, etc.).	
ETS SOLENOID [ABNORMAL]	• Current flow through E-TS solenoid is abnormally larger or smaller than specifications.	

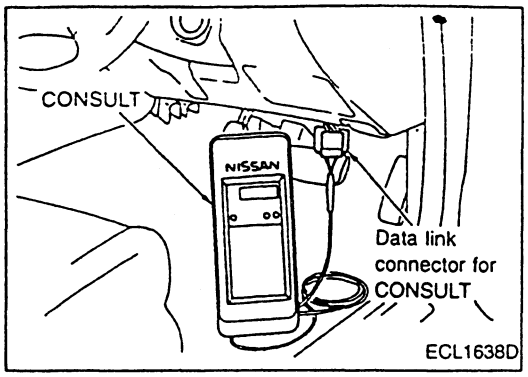
CONSULT (Cont'd)

Diagnostic item	Diagnostic item is detected when...	Check item
LSD SOLENOID [OPEN]	• Specified voltage is not applied to A-LSD solenoid control terminal (open solenoid circuit, etc.).	A-LSD relay, solenoid and circuits
LSD SOLENOID [SHORT]	• A-LSD solenoid control terminal voltage is abnormally high or low (shorted solenoid circuit, etc.).	
LSD SOLENOID [ABNORMAL]	• Current flow through A-LSD solenoid is abnormally larger or smaller than specifications.	
ETS F/S VALVE [OPEN]	• E-TS fail-safe valve control terminal voltage is abnormally high or low (open fail-safe valve circuit, etc.).	E-TS fail-safe system, solenoid and circuits
ETS F/S VALVE [SHORT]	• E-TS fail-safe valve control terminal voltage is abnormally high or low (shorted fail-safe valve circuit, etc.).	
ETS F/S VALVE [ON FAILURE]	• While E-TS fail-safe valve is being controlled to be set to OFF, it turns ON.	
CONTROL UNIT	• Abnormalities occur in E-TS/ABS control unit process function.	Control unit power supply circuit
ABS MOTOR [ABNORMAL WHEEL LOCKING]	• ABS motor speed is abnormally low.	ABS motor, motor relay and circuits

NOTE:

- All of the 4WD, A-LSD and ABS warning lamps illuminate. "Self-diagnosis could not detect any malfunctions" can sometimes appear on CONSULT display as a diagnostic result. When it occurs, check engine speed signal circuit.
- If "ABS" does not appear on system selection screen, check ATTESA E-TS PRO/ABS control unit for improper operation and diagnosis connector circuit condition. Also confirm that CONSULT card No. is suitable for use with ATTESA E-TS PRO/ABS system.

CONSULT (Cont'd)



DATA MONITOR PROCEDURE

- Refer to CONSULT Instruction Manual for details on data monitor function.

1. Turn ignition switch OFF.
2. Connect CONSULT connector to data link connector for CONSULT.
3. Turn ignition switch ON.
4. Touch "START" on CONSULT screen.
5. Touch "ABS" on CONSULT screen.

- **If "START" is touched immediately after engine is started or ignition switch is turned on, "ABS" may not be displayed on "SELECT SYSTEM" screen. To display "ABS", repeat the data monitor procedure from the beginning.**

6. Touch "DATA MONITOR".
7. Touch "SETTING" to set recording condition.
8. Touch "LONG TIME" and then "ENTER".
9. Return to "SELECT MONITOR ITEM" screen and touch "ALL SIGNALS".
10. Touch "START".
11. Display data monitor.
12. If necessary, sequentially touch "REC START", "REC STOP", "DATA DISPLAY", "NUMBER PRINT" and "PRINT" to print out the data.

CONSULT (Cont'd)

DATA MONITOR MODE

Display	Select monitor item: ECM input signals	Select monitor item: All signals	Select monitor item: Selection from menu	Remarks
FR RH SEN [km/h]	○	○	○	Vehicle speed, which is processed from front right wheel sensor signal, appears on display.
FR LH SEN [km/h]	○	○	○	Vehicle speed, which is processed from front left wheel sensor signal, appears on display.
RR RH SEN [km/h]	○	○	○	Vehicle speed, which is processed from rear right wheel sensor signal, appears on display.
RR LH SEN [km/h]	○	○	○	Vehicle speed, which is processed from rear left wheel sensor signal, appears on display.
FR & RR G SEN1 [+/–] [G]	○	○	○	G value, which is processed from FR & RR G sensor 1 signal, appears on display.
FR & RR G SEN2 [+/–] [G]	○	○	○	G value, which is processed from FR & RR G sensor 2 signal, appears on display.
SIDE G SEN [L/R] [G]	○	○	○	G value, which is processed from side G sensor signal, appears on display.
THRTL POS SEN [V]	○	○	○	Signal voltage sent from throttle position sensor appears on display.
STOP LAMP SW [ON-OFF]	○	○	○	Stop lamp switch ON-OFF condition appears on display.
ENG SPEED SIG [STOP/RUN]	○	○	○	Engine speed, which is based on camshaft position sensor signal, appears on display.
PRESSURE SW [ON/OFF]	○	○	○	Pressure switch ON-OFF condition, which is determined from pressure switch signal, appears on display.
AIR BLEED SW [ON-OFF]	○	○	○	Air bleed switch ON-OFF condition, which is determined from air bleed switch signal, appears on display.
OIL LEVEL SW [ON-OFF]	○	○	○	Oil level switch ON-OFF condition, which is determined from oil level switch signal, appears on display.
F/R IN SOL [ON-OFF]	—	○	○	Control condition (ON-OFF) of front right wheel IN ABS solenoid appears on display.
F/R OUT SOL [ON-OFF]	—	○	○	Control condition (ON-OFF) of front right wheel OUT ABS solenoid appears on display.
F/L IN SOL [ON-OFF]	—	○	○	Control condition (ON-OFF) of front left wheel IN ABS solenoid appears on display.
F/L OUT SOL [ON-OFF]	—	○	○	Control condition (ON-OFF) of front left wheel OUT ABS solenoid appears on display.
REAR IN SOL [ON-OFF]	—	○	○	Control condition (ON-OFF) of rear wheel IN ABS solenoid appears on display.
REAR OUT SOL [ON-OFF]	—	○	○	Control condition (ON-OFF) of rear wheel OUT ABS solenoid appears on display.
ETS SOLENOID [A]	—	○	○	Current flow through E-TS solenoid appears on display.
LSD SOLENOID [A]	—	○	○	Current flow through A-LSD solenoid appears on display.
ETS F/S VALVE	—	○	○	Control condition (ON-OFF) of E-TS fail-safe valve appears on display.
ABS ACTUATOR [ON-OFF]	—	○	○	ABS actuator relay condition (ON-OFF) appears on display.
ABS MOTOR [ON-OFF]	—	○	○	ABS motor relay condition (ON-OFF) appears on display.
ETS/LSD MOTOR [ON-OFF]	—	○	○	ATTESA E-TS PRO actuator condition (ON-OFF) appears on display.

CONSULT (Cont'd)

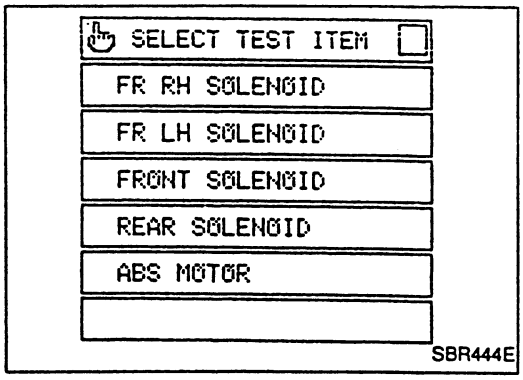
Display	Select monitor item			Remarks
	ECM input signals	All signals	Selection from menu	
ETS/LDS RELAY [ON-OFF]	—	—	○	ATTESA E-TS PRO actuator motor relay condition (ON-OFF) appears on display.
ETS ACTUATOR [ON-OFF]	—	—	○	E-TS actuator relay condition (ON-OFF) appears on display.
LSD ACTUATOR RELAY [ON-OFF]	—	—	○	A-LSD actuator relay condition (ON-OFF) appears on display.
WARNING LAMP [ON-OFF]	—	○	○	Control condition of ABS warning lamp appears on display.
G-SEN VOLT1 [V]	○	—	○	Voltage furnished from ATTESA E-TS PRO/ABS control unit appears on display.
G-SEN VOLT2 [V]	○	—	○	Voltage furnished from ATTESA E-TS PRO/ABS control unit appears on display.
BATTERY VOLT [V]	○	—	○	Voltage furnished from ATTESA E-TS PRO/ABS control unit appears on display.
VOLTAGE [V]	—	—	○	Value measured with voltage probe appears on display.
PULSE [msec] or [Hz] or [%]	—	—	○	Refer to CONSULT Operation Manual.

CONSULT (Cont'd)

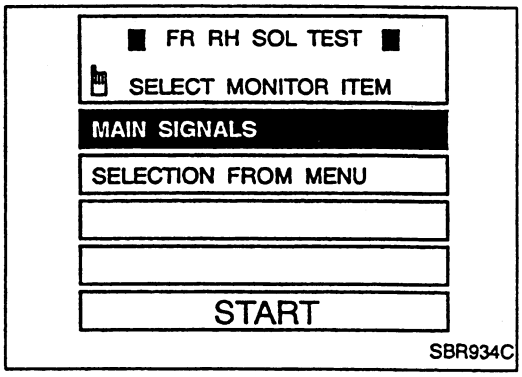
ACTIVE TEST PROCEDURE

- When conducting Active test, vehicle must be stationary.
- Confirm that brakes have been bled completely.
- When ABS warning lamp stays on, never conduct Active test.

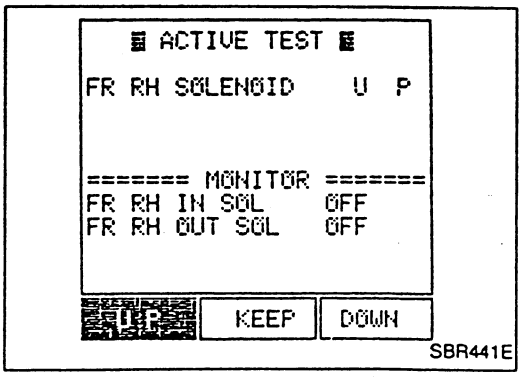
1. Connect CONSULT to Data Link Connector for CONSULT and start engine.
2. Touch "START" on CONSULT screen.
3. Touch "ABS", then "ACTIVE TEST".
4. "SELECT TEST ITEM" screen is displayed.



5. Select active test item by touching screen.



6. Touch "START" on condition that "MAIN SIGNALS" item is highlighted.



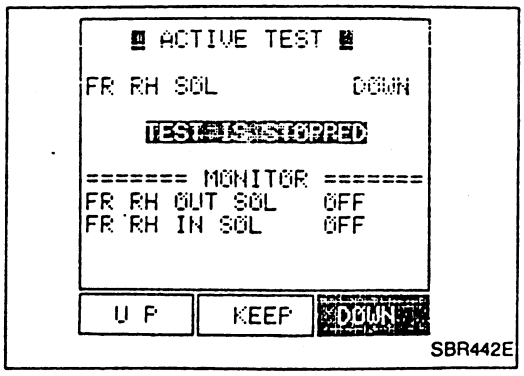
7. "ACTIVE TEST" screen is displayed.

ABS solenoid valve

- To check that ABS solenoid valves (inlet and outlet) operate in the following manner, touch "UP", "KEEP" and "DOWN" on the screen while observing the monitor.

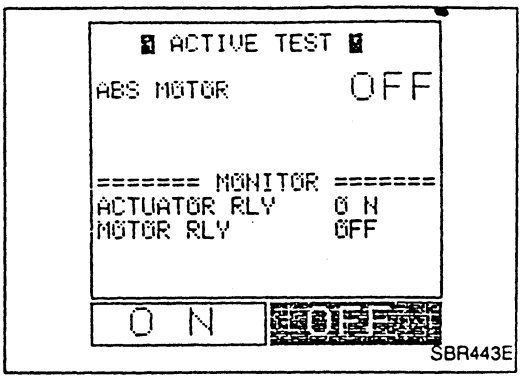
Operation	UP	KEEP	DOWN
IN ABS S/V	OFF	ON	ON
OUT ABS S/V	OFF	OFF	ON*

*: Solenoid valve stays ON for 1 to 2 seconds after touching the key, and then turns OFF.



- If the active test is conducted with brake pedal depressed, the brake pedal travel limit may change. This is a normal condition.
- "TEST IS STOPPED" message is displayed 10 seconds after the operation is started.
- If the active test needs to be performed again after "TEST IS STOPPED" is displayed, repeat step 6.

CONSULT (Cont'd)



ABS motor

- Touch "ON" and "OFF" on the screen to check that ABS motor relay and ABS actuator relay operate as follows:

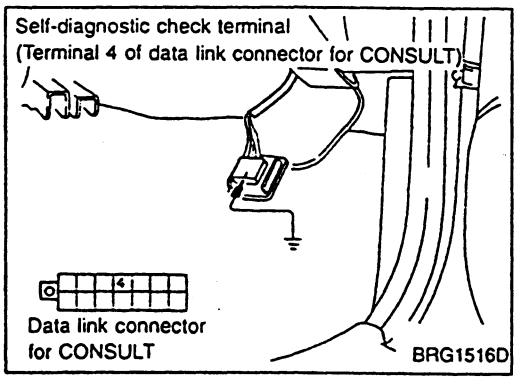
Operation	ON	OFF
ABS actuator relay	ON	ON
ABS motor relay	ON	OFF

- If the active test is conducted with brake pedal depressed, the brake pedal travel limit may change. This is a normal condition.
- "TEST IS STOPPED" message is displayed 10 seconds after the operation is started.

Self-diagnosis

DESCRIPTION

When a problem occurs in the ATTESA E-TS PRO SYSTEM, the 4WD, A-LSD and ABS warning lamps on the instrument panel come on either separately or simultaneously. To actuate the self-diagnostic results mode, ground the self-diagnostic check terminal 4 located on the data link connector for CONSULT. The ABS warning lamp, then, flashes and indicates the location of the malfunction.



SELF-DIAGNOSIS PROCEDURE

1. Collect information on the concern from the customer, and then perform basic inspections.
2. Drive vehicle at approx. 30 km/h for approx. 1 minute.
3. Stop vehicle and start diagnosis.
4. Turn ignition switch "OFF".
5. Ground the self-diagnostic check terminal 4.
6. Turn ignition switch "ON" to start the self-diagnostic results mode.

CAUTION:

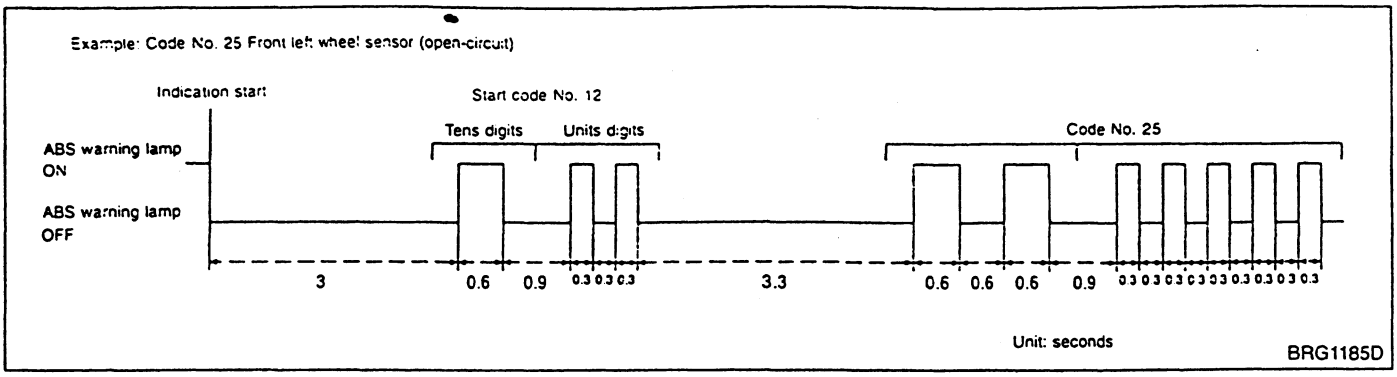
- **Keep terminal 4 grounded during self-diagnosis.**
- **Do not depress brake pedal. (Self-diagnosis would not start.)**
- **Do not start engine. (Self-diagnosis would not start.)**

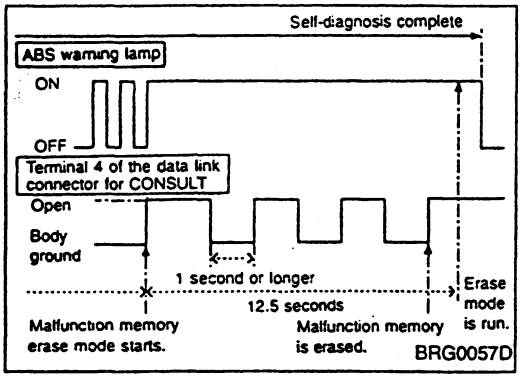
7. After 3 or 4 seconds, ABS warning lamp starts blinking to indicate the malfunction code No.
 - The indication terminates after 5 minutes. Turning the ignition switch from "OFF" to "ON" resumes blinking the indication.
8. Verify the location of the malfunction with "MALFUNCTION CODE/SYMPTOM CHART", BR-23. Then make the necessary repairs.
9. After the malfunctions are repaired, erase the malfunction codes stored in the control unit. Refer to "HOW TO ERASE SELF-DIAGNOSTIC RESULTS" on the next page.
10. Rerun the self-diagnostic results mode to verify that the malfunction codes have been erased.
11. Disconnect the check terminal from the ground. The self-diagnostic results mode is now complete.
12. Drive vehicle at approx. 30 km/h for approx. 1 minute, and then check that the ABS warning lamp is off.

HOW TO READ SELF-DIAGNOSTIC RESULTS (Malfunction codes)

- Determine the code No. by observing the time and the frequency that the ABS warning lamp blinks ON and OFF.
- When multiple malfunctions occur at a time, up to three code numbers can be stored; the latest malfunction will be indicated first.
- The indication begins with the start code No. 12. A maximum of three code numbers appear in the order of the latest one first. The indication then returns to the start code No. 12 to repeat.
- The start code No. 12 is only indicated repeatedly when there is no malfunction.

Self-diagnosis (Cont'd)





HOW TO ERASE SELF-DIAGNOSTIC RESULTS (Malfunction codes)

1. Turn the ignition switch "ON" and start the engine.
2. Drive the vehicle at approx. 30 km/h for approx. 1 minute to check that there is no other malfunction.
3. Stop the vehicle.
4. Turn the ignition switch "OFF".
5. Ground the self-diagnostic check terminal 4.
6. Turn the ignition switch "ON" to start the self-diagnostic results mode.

CAUTION:
Do not depress the brake pedal during self-diagnosis. Do not start the engine. (The self-diagnosis would not start.)

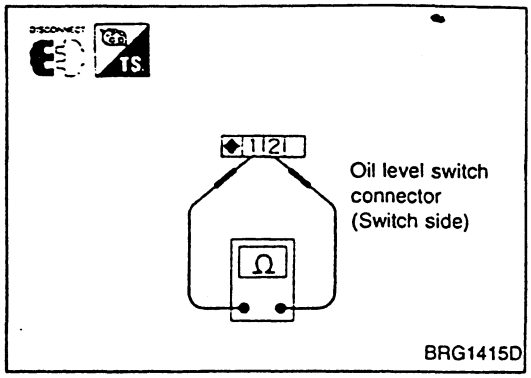
7. The ABS warning lamp starts to blink 3 or 4 seconds after the self-diagnostic results mode is started.
8. Under the self-diagnostic results mode, the malfunction memory erase mode starts when the check terminal is disconnected from the ground.
9. Ground the check terminal 3 times or more in succession within 12.5 seconds after the erase mode starts. (Each grounding must be 1 second or longer.)
10. Disconnect the grounding cable from the check terminal to erase the malfunction memory and complete the self-diagnosis. The ABS warning lamp , then, turns off.
11. Turn the ignition switch "OFF".

Self-diagnosis (Cont'd)

MALFUNCTION CODE/SYMPTOM CHART

Malfunction code	Malfunctioning part	Detecting timing		Warning lamps ON			Fail-safe operation
		When starting engine	Vehicle driving	ABS	4WD	A-LSD	
21	Front right wheel sensor (open-circuit)	○	○	○	○	○	○
22	Front right wheel sensor (short-circuit)	—	○	○	○	○	○
25	Front left wheel sensor (open-circuit)	○	○	○	○	○	○
26	Front left wheel sensor (short-circuit)	—	○	○	○	○	○
31	Rear right wheel sensor (open-circuit)	○	○	○	○	○	○
32	Rear right wheel sensor (short-circuit)	—	○	○	○	○	○
35	Rear left wheel sensor (open-circuit)	○	○	○	○	○	○
36	Rear left wheel sensor (short-circuit)	—	○	○	○	○	○
41	Front right outlet solenoid valve and circuit	○	○	○	—	—	○
42	Front right inlet solenoid valve and circuit	○	○	○	—	—	○
45	Front left outlet solenoid valve and circuit	○	○	○	—	—	○
46	Front left inlet solenoid valve and circuit	○	○	○	—	—	○
55	Rear outlet solenoid valve and circuit	○	○	○	—	—	○
56	Rear inlet solenoid valve and circuit	○	○	○	—	—	○
57	Battery voltage (ATTESA E-TS PRO/ABS control unit power supply)	○	○	○	—	—	○
61	ABS actuator motor and motor relay circuit	○	○	○	—	—	○
63	ABS actuator relay circuit	○	○	○	—	—	○
64	FR & RR G sensor 1	○	○	○	○	○	○
65	FR & RR G sensor 2	○	○	○	○	○	○
66	FR & RR G sensor 1 or 2	○	○	○	○	○	○
68	G sensor voltage	○	○	○	○	○	○
69	Side G sensor voltage	○	○	○	○	○	○
71	ATTESA E-TS PRO/ABS control unit and circuit	○	○	○	○	○	○
72	Throttle position sensor	○	○	—	○	○	○
73, 74	E-TS/LSD actuator motor	○	○	—	○	○	○
76, 77	Pressure switch	○	○	—	○	○	○
78	Air bleed switch	○	○	—	○*	○*	○
79	Oil level switch	—	○	—	○	○	○
91, 92, 93	E-TS solenoid	○	○	—	○	○	○
94, 95, 96	E-TS fail-safe solenoid	○	○	—	○	○	○
97, 98, 99	LSD solenoid	○	○	—	○	○	○

*: Normal vehicle operation is controlled although warning lamp illuminates.

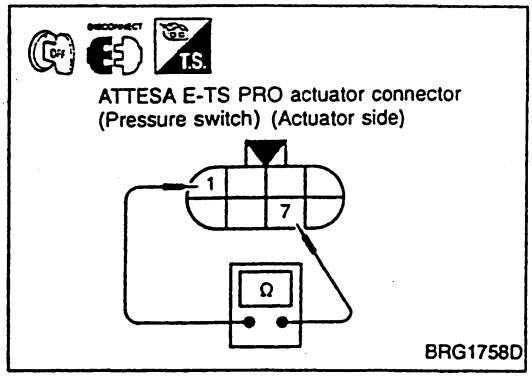


Component Parts Inspection

OIL LEVEL SWITCH

Remove oil level switch connector and check continuity between terminals ① and ②.

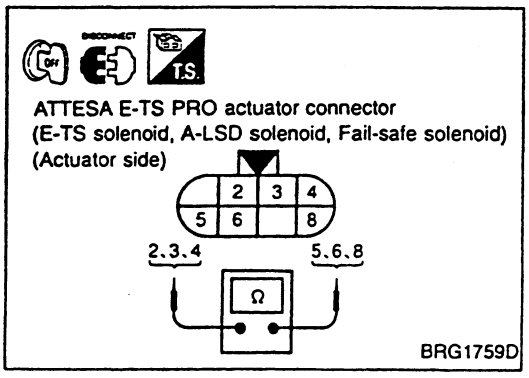
Reservoir tank oil level is normal:
Continuity exists.
Reservoir tank oil level is too low:
Continuity does not exist.



ATTESA E-TS PRO ACTUATOR

Pressure switch

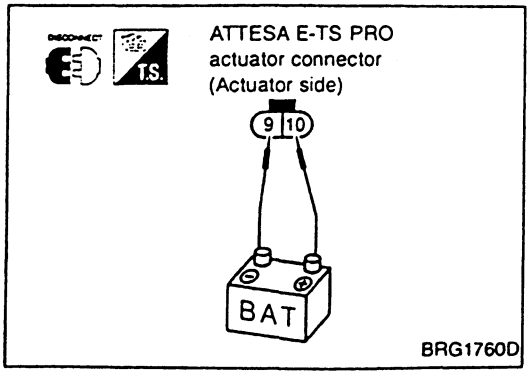
- Remove pressure switch connector and check continuity between terminals ① and ⑦.
 Accumulator internal pressure decreasing to approximately 2.6 MPa (27.0 kg/cm²) or less:
 Continuity exists.
 Accumulator internal pressure increasing to approximately 3.8 MPa (39.0 kg/cm²):
 Continuity does not exist.
- Immediately after actuator motor has stopped, accumulator internal pressure is high. Continuity does not exist.
- Accumulator internal pressure increases while actuator motor is operating. Accumulator internal pressure decreases when actuator motor is at rest.



E-TS solenoid, A-LSD solenoid and fail-safe solenoid

Remove connectors from E-TS, A-LSD and fail-safe solenoids. Measure resistance between individual connector terminals listed below:

E-TS solenoid terminals ③ and ⑤ : Approx. 6Ω
A-LSD solenoid terminals ④ and ⑧ : Approx. 6Ω
Fail-safe solenoid terminals ② and ⑥ : Approx. 11Ω



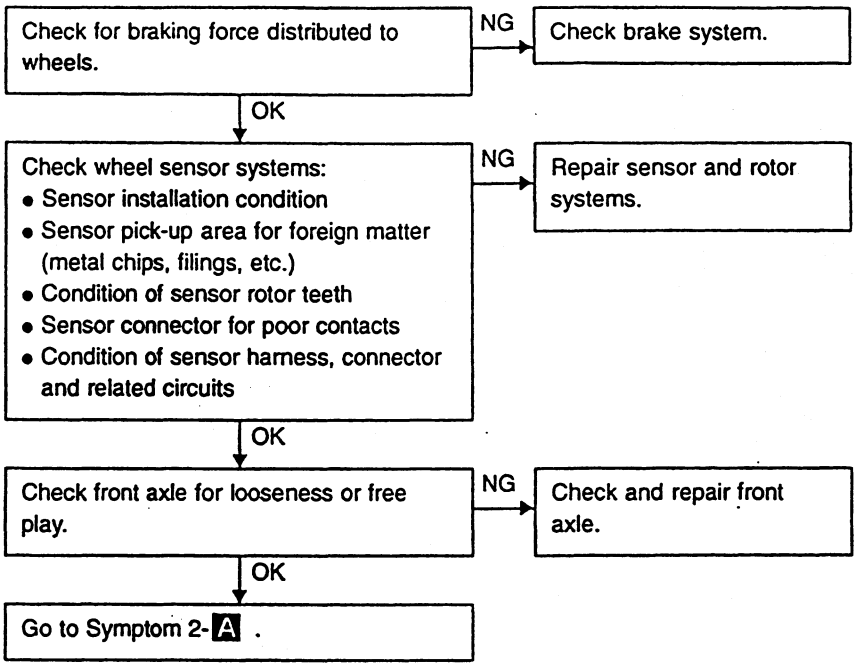
Motor

Remove connector from motor. Apply battery voltage across terminals ⑨ and ⑩ to make sure that motor starts.

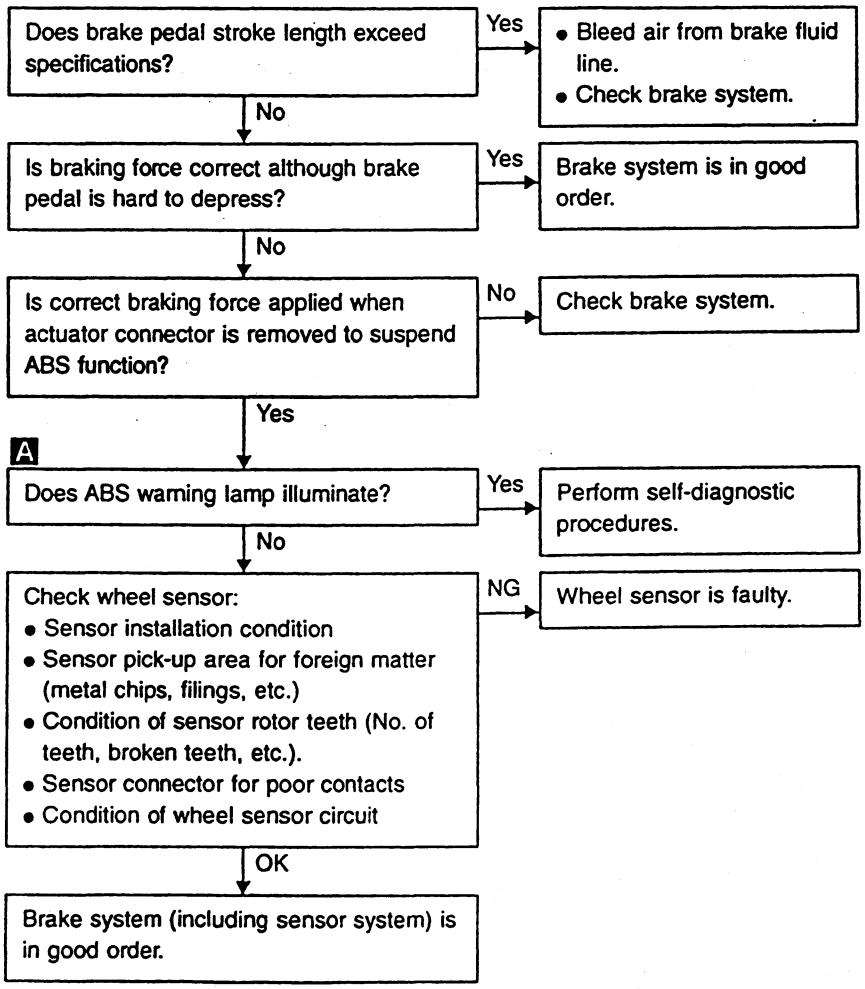
CAUTION:
To avoid motor overheating, do not apply battery voltage for more than 5 seconds at a time.

Trouble Diagnoses by Symptom

SYMPTOM 1 — ABS works frequently.



SYMPTOM 2 — Unexpected pedal action



Trouble Diagnoses by Symptom (Cont'd)

SYMPTOM 3 — Long stopping distance

Is stopping distance longer on snow-covered or gravel roads than on paved roads?
- Yes → Stopping distance of ABS-equipped vehicle is sometimes longer than vehicle without ABS.
- No ↓

Does stopping distance still remain longer than vehicle without ABS after removing actuator connector to suspend ABS function?
- Yes →
 - Bleed air from brake system.
 - Check condition of brake system.
- No ↓

Go to Symptom 2-A .

SYMPTOM 4 — ABS does not work.

Does ABS warning lamp illuminate?
- Yes → Perform self-diagnostic procedures to locate the cause of problem.
- No ↓

Does ABS effectively operate at speeds of less than 10 km/h only?
- No → System is in good order.
- Yes ↓

Go to Symptom 2-A .

SYMPTOM 5 — Pedal vibration and noise

Does brake pedal vibration/noise occur during engine starting?
- Yes → Perform self-diagnostic procedures to locate the cause of problem.
- No ↓

Does brake pedal vibration/noise occur only when brake pedal is slightly depressed?
CAUTION:
ABS sometimes operates under any of the following conditions where wheel speed variations occurs.
- **During gearshift operation**
- **During clutch pedal operation**
- **Driving over bumps or gutters (50-mm high or deep) at 50 km/h or above.**
- **During standing starts immediately after starting engine (at speeds of approximately 10 km/h or above)**

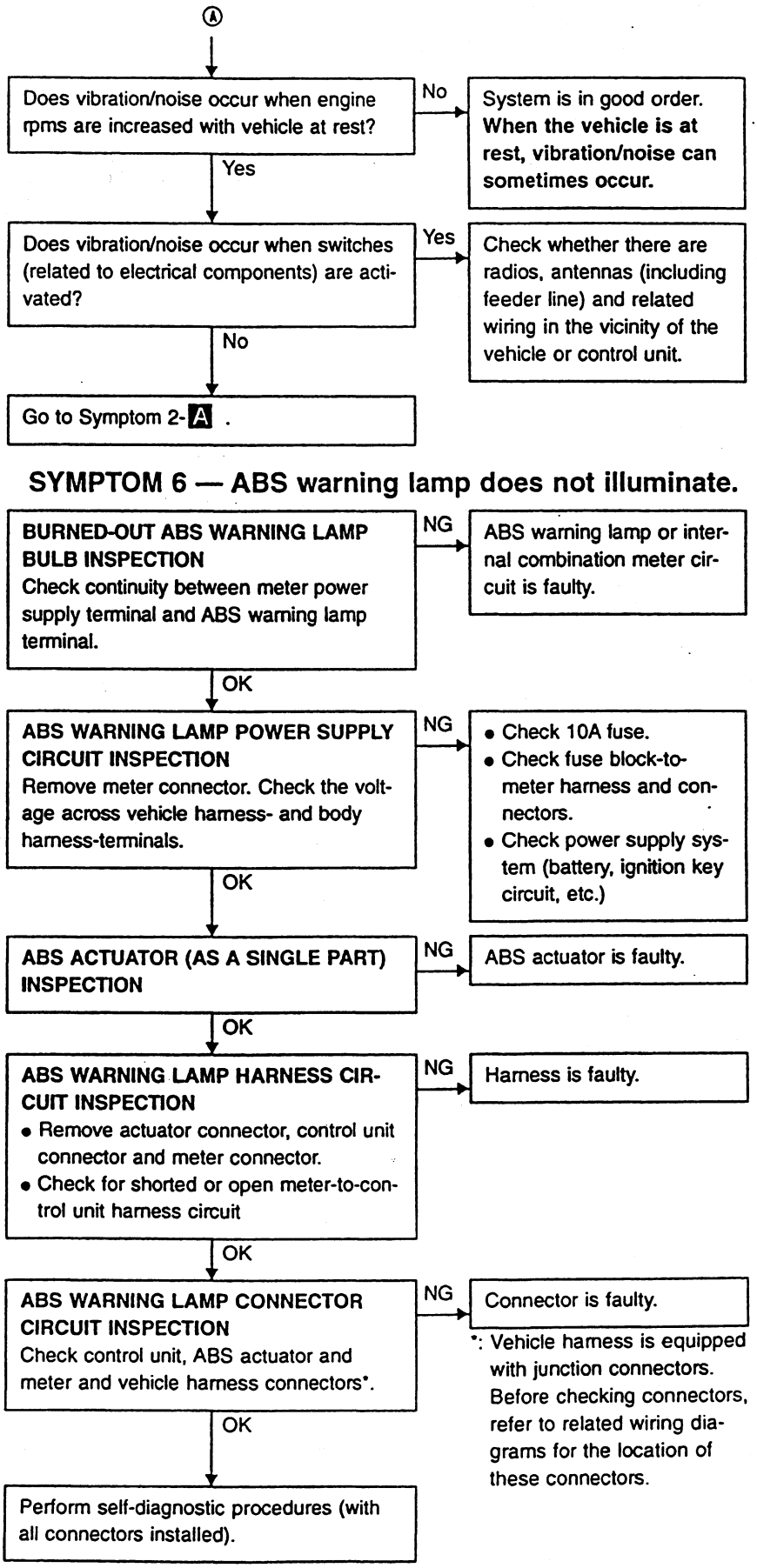
- No → System is in good order.
- Yes ↓

Does brake pedal vibration/noise occur during normal vehicle operation?
CAUTION:
ABS sometimes operates except for sudden braking operation under any of the following conditions.
- **During low "μ" road driving**
- **Turning curves at high speed**
- **Riding over bumps**

- No → System is in good order.
- Yes ↓

Ⓐ

Trouble Diagnoses by Symptom (Cont'd)



SYMPTOM 6 — ABS warning lamp does not illuminate.

*: Vehicle harness is equipped with junction connectors. Before checking connectors, refer to related wiring diagrams for the location of these connectors.

Trouble Diagnoses by Symptom (Cont'd)

SYMPTOM 7 — 4WD warning lamp does not illuminate

BURNED-OUT 4WD WARNING LAMP INSPECTION
Check continuity between meter power supply terminal and 4WD warning lamp terminal.

NG → 4WD warning lamp or internal combination meter circuit is faulty.

OK ↓

4WD WARNING LAMP POWER SUPPLY CIRCUIT INSPECTION
Remove meter connector. Check to make sure that voltage between vehicle harness terminal and body ground is approx. 12V.

NG →
- Check 10A fuse.
- Check fuse block-to-meter harness and connector.
- Check power supply system (battery and ignition switch circuit).

OK ↓

E-TS ACTUATOR RELAY (AS A SINGLE PART) INSPECTION

NG → E-TS actuator relay is faulty.

OK ↓

4WD WARNING LAMP HARNESS CIRCUIT INSPECTION
- Remove E-TS actuator relay connector and control unit connector.
- Check for open or shorted meter-to-control unit harness.

NG → Harness is faulty.

OK ↓

4WD WARNING LAMP CONNECTOR CIRCUIT INSPECTION
Check control unit, E-TS actuator relay, meter and vehicle harness connectors*.

NG → Connector is faulty.

OK ↓

Perform self-diagnostic procedures (with all connectors installed).

*: Vehicle harness is equipped with junction connectors. Before checking connectors, refer to related wiring diagrams for the location of these connectors.

Trouble Diagnoses by Symptom (Cont'd)

SYMPTOM 8 — A-LSD warning lamp does not illuminate.

A-LSD WARNING LAMP BULB (BURNED-OUT) INSPECTION
Check to make sure that continuity exists between meter power terminal and A-LSD warning lamp terminal.
NG → A-LSD warning lamp or internal combination circuit is faulty.
OK ↓

A-LSD WARNING LAMP POWER SUPPLY CIRCUIT INSPECTION
Remove meter connector and measure voltage across vehicle harness terminal and ground to make sure that it is approx. 12V.
NG →
- Check 10A fuse.
- Check fuse block-to-meter harness and connector.
- Check power supply system (battery, ignition switch circuit, etc.).

OK ↓

A-LSD ACTUATOR (AS A SINGLE UNIT) INSPECTION
NG → A-LSD actuator relay is faulty.
OK ↓

A-LSD WARNING LAMP HARNESS CIRCUIT INSPECTION
- Remove A-LSD actuator relay connector, control unit connector and meter connector.
- Check for open or shorted meter-to-control unit harness.

NG → Harness is faulty.
OK ↓

A-LSD WARNING LAMP CIRCUIT CONNECTOR INSPECTION
Check connectors used with control unit, A-LSD actuator relay, meter and vehicle harness*.
NG → Connector(s) are faulty.
OK ↓

Install all connectors and perform self-diagnostic procedures.

*: Vehicle harness is equipped with junction connectors. Before checking connectors, refer to related wiring diagrams for the location of these connectors.

SYMPTOM 9 — Hard to depress pedal when starting (4WD and A-LSD warning lamps remain OFF.)

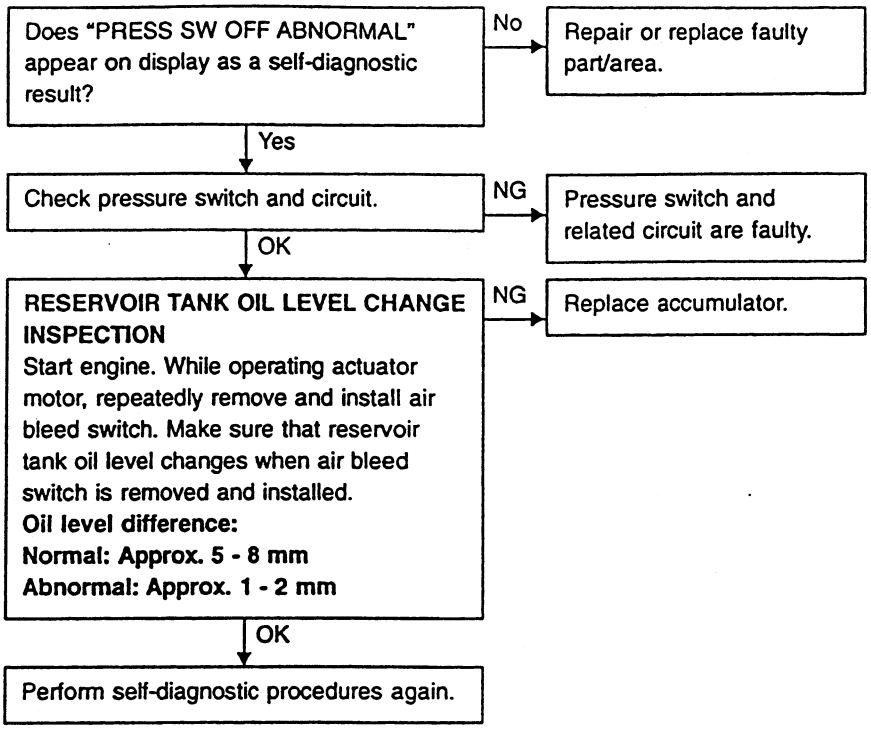
Throttle position sensor and related circuit inspection
NG → Throttle position sensor circuit is faulty.
OK ↓

Reverse lamp switch and related circuit inspection
NG → Reverse lamp switch and circuit are faulty.
OK ↓

Perform self-diagnostic procedures again.

Trouble Diagnoses by Symptom (Cont'd)

SYMPTOM 10 — ATTESA E-TS PRO actuator relay turns ON and OFF frequently. Actuator operates ON and OFF repeatedly.



Description

ABS FUNCTION

- While the ABS is operating, the brake pedal slightly vibrates, along with its operating sound. This indicates that the ABS is operating normally (no problem).
- When starting the engine or immediately after the engine has started, an operating sound is emitted from motors inside the engine room. This indicates that the motor is operating normally (no problem).
- The stopping distance of vehicles equipped with ABS can be longer than that of those without ABS while driving on rough, gravel or snow-covered roads.

E-TS FUNCTION

- The E-TS system and the ABS are controlled by a single control unit. Signals from multiple sensors are received and acted upon to provide a comprehensive control system.
- In the event of an E-TS/ABS electrical system failure, the 4WD warning lamp and ABS warning lamp (located in the combination meter cluster) will illuminate either separately or simultaneously to inform the driver of a problem. Self-diagnosis begins immediately and the results (problem items/areas) appear on the CONSULT display according to the control unit LED ON-OFF count. Refer to the Table below if the electrical system diagnostic tester (CONSULT) is used to troubleshoot the problem.

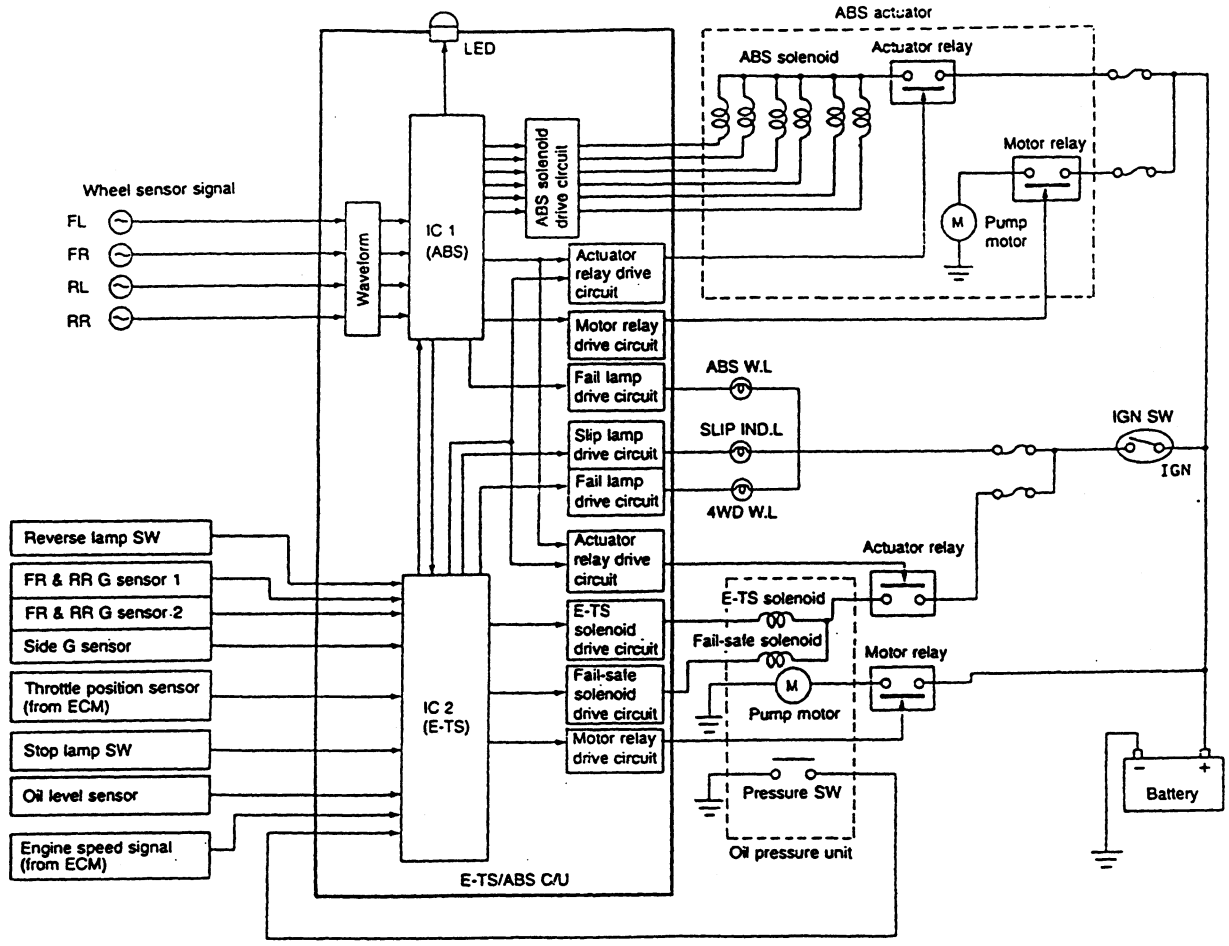
Diagnostic test mode	Remarks
Work support	E-TS air bleeding, E-TS oil pressure check and lock check
Self-diagnostic results	Compatible with E-TS/ABS
Data monitor	Compatible with E-TS/ABS
Active test	ABS solenoid valve ON-OFF, ABS motor ON-OFF
ECM part number	E-TS/ABS control unit

Fail-Safe Function

If a malfunction occurs in the E-TS/ABS, the 4WD warning lamp and ABS warning lamp (located in the combination meter cluster) will illuminate either separately or simultaneously. If only the 4WD warning lamp illuminates, decreased 4WD conditions prevail while the ABS operates normally. If only the ABS warning lamp illuminates, the ABS will not function. The E-TS operates normally while brakes operate as they would on a vehicle without ABS. If both the 4WD warning and ABS lamps are illuminated, decreased 4WD conditions prevail and ABS will not function normally. Brakes operate as they would on a vehicle without ABS.

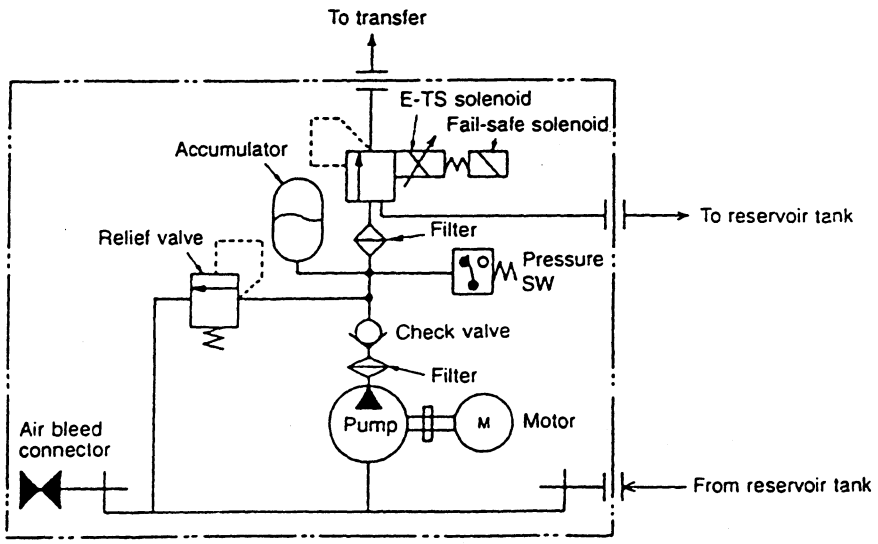
- If a malfunction occurs in the control unit, G sensors, wheel sensors and/or engine rpm signal circuit, the 4WD warning lamp and ABS warning lamp will illuminate simultaneously.

System Diagram



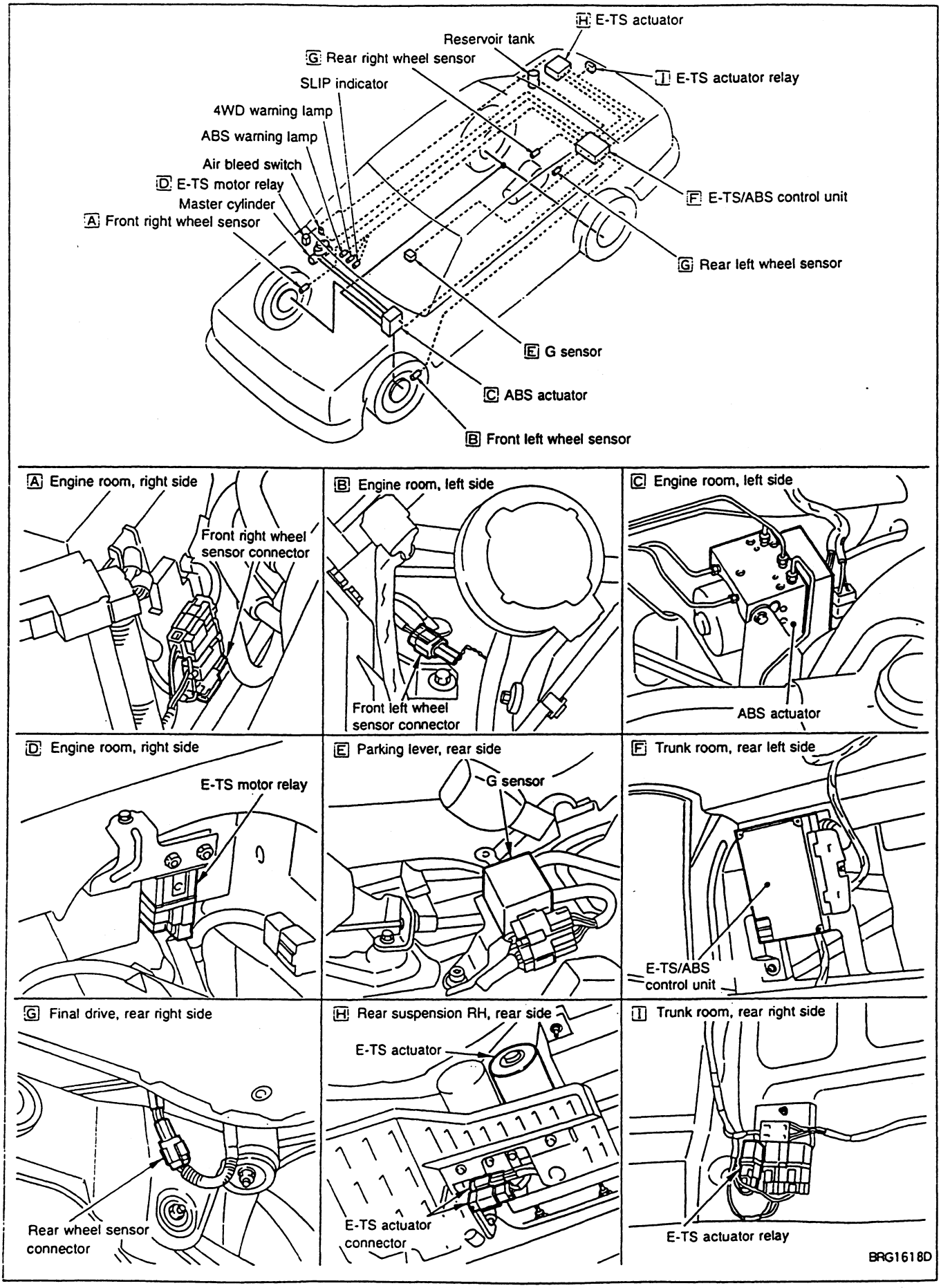
BRG0858D

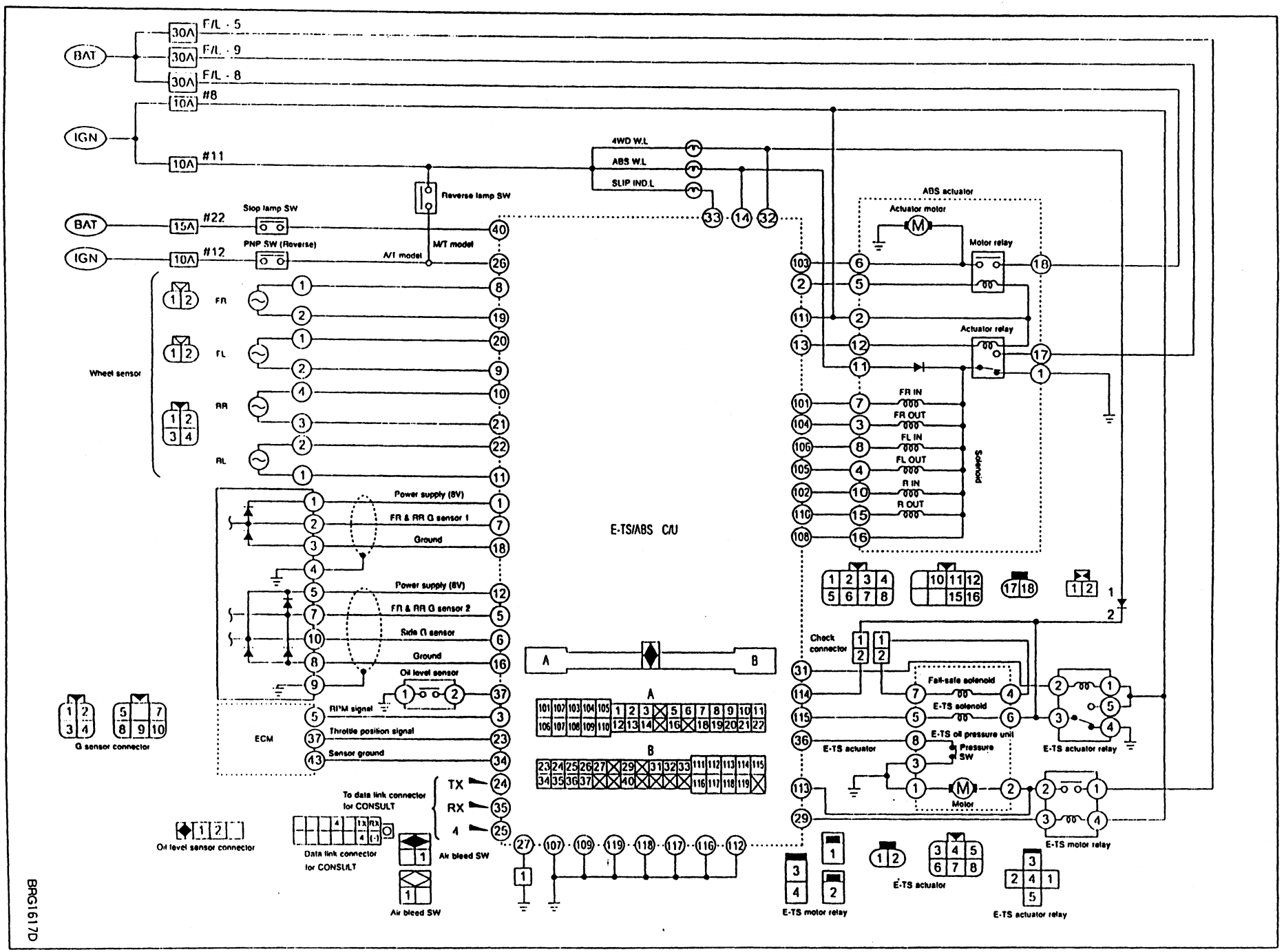
Hydraulic Circuit Diagram



BRG1095D

Component Parts Location




BAT
IGN
30A F/L - 5
30A F/L - 9
30A F/L - 8
10A #8
10A #11
4WD W.L
ABS W.L
SLIP IND.L
Reverse lamp SW
Stop lamp SW
PNP SW (Reverse)
A/T model
M/T model
15A #22
10A #12
Wheel sensor
FR
FL
RR
RL
ABS actuator
Actuator motor
Motor relay
Actuator relay
Solenoid
FR IN
FR OUT
FL IN
FL OUT
R IN
R OUT
E-TS/ABS C/U
Power supply (8V)
FR & RR G sensor 1
Ground
Power supply (8V)
FR & RR G sensor 2
Side G sensor
Ground
Oil level sensor
RPM signal
Throttle position signal
Sensor ground
ECM
G sensor connector
Oil level sensor connector
To data link connector for CONSULT
Data link connector for CONSULT
TX
RX
Air bleed SW
Air bleed SW
Check connector
Fail-safe solenoid
E-TS solenoid
E-TS oil pressure unit
Pressure SW
Motor
E-TS actuator
E-TS actuator relay
E-TS motor relay
E-TS actuator
E-TS actuator relay
E-TS motor relay

BRG1617D

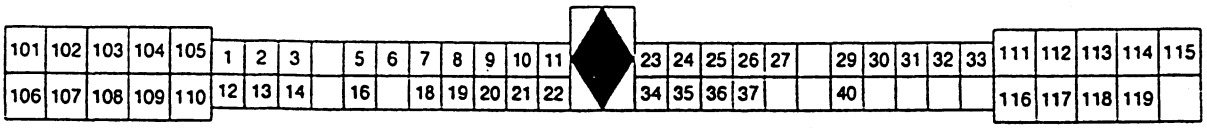
Control Unit Input/Output Signal Specifications

USING CIRCUIT TESTER

E-TS/ABS control unit

To perform the following inspection switch should be turned ON with ABS control unit connector and actuator connector properly connected.

E-TS/ABS control unit connector



BRG1411D

Terminal No. +	Terminal No. −	Item	Specifications*1		Check item (Reference)
111		Battery	Ignition switch ON	Battery voltage (Approx. 12V)	Control unit power supply circuit
107 109 112 116 117 118 119	Body ground	Ground	—		Control unit ground circuit
40		Stop lamp signal	Depress brake pedal.	Battery voltage (Approx. 12V)	Stop lamp switch and circuit
			Release brake pedal.	Approx. 0V	
2		ABS motor relay	ABS motor operating (CONSULT set in active test mode)	Less than approx. 2V	ABS motor, motor relay and circuits
			ABS motor not operating (ignition switch ON)	Battery voltage (Approx. 12V)	
13		ABS actuator relay	Actuator relay operating (engine operating)	Less than approx. 2V	ABS actuator relay and circuit
			Actuator relay not operating (fail-safe system operating or before engine starting)	Battery voltage (Approx. 12V)	
108		ABS actuator relay monitor	Actuator relay operating (engine operating)	Battery voltage (Approx. 12V)	ABS warning lamp and ABS actuator relay monitor and circuits
			Actuator relay not operating (fail-safe system operating or before engine starting)	Approx. 0V	

Control Unit Input/Output Signal Specifications (Cont'd)

Terminal No. +	Terminal No. −	Item	Specifications*1		Check item (Reference)
101	Body ground	Front right wheel IN solenoid	Actuator operating (CONSULT set in active test mode) or actuator relay not operating. (Fail-safe system operating or before engine starting, etc.)	Approx. 0V	ABS solenoid and circuit
104		Front right wheel OUT solenoid			
106		Front left wheel IN solenoid			
105		Front left wheel OUT solenoid			
102		Rear wheel IN solenoid	Actuator not operating and actuator relay operating (engine operating and vehicle at rest)	Battery voltage (Approx. 12V)	
110		Rear wheel OUT solenoid			
103		ABS motor monitor	ABS motor operating (CONSULT set in active test mode)	Battery voltage (Approx. 12V)	ABS motor monitor circuit
			ABS motor not operating (ignition switch ON)	Approx. 0V	
32		4WD warning lamp*2	4WD warning lamp ON	Approx. 0V	4WD warning lamp and circuit
			4WD warning lamp OFF	Battery voltage (Approx. 12V)	
14		ABS warning lamp*3	ABS warning lamp ON	Approx. 0V	ABS warning lamp and circuit
			ABS warning lamp OFF	Battery voltage (Approx. 12V)	
33		SLIP indicator*4	SLIP indicator ON	Approx. 0V	SLIP indicator and circuit
			SLIP indicator OFF	Battery voltage (Approx. 12V)	
8	19	Front right wheel sensor	Vehicle operating (at approx. 30 km/h)*4	Pulse signal at 200 Hz per second	Wheel sensor and circuit
20	9	Front left wheel sensor			
10	21	Rear right wheel sensor			
22	11	Rear left wheel sensor			
115	Body ground	E-TS solenoid	Engine at idle with vehicle at rest	Battery voltage (Approx. 12V)	E-TS actuator relay solenoid and circuit
29		E-TS motor relay	Ignition switch ON	Battery voltage (Approx. 12V)	E-TS motor, motor relay and circuits
113		E-TS motor monitor	Actuator motor operating	Battery voltage (Approx. 12V)	
			Actuator motor not operating	Approx. 0V	

Control Unit Input/Output Signal Specifications (Cont'd)

Terminal No. +	Terminal No. −	Item	Specifications*1		Check item (Reference)
1	18	G sensor power supply 1	Ignition switch ON (with vehicle located on flat surface)	Approx. 8V (Reference)	G sensor and circuit
7	18	FR & RR G sensor 1		Approx. 2.5V (Reference)	
12	16	G sensor power supply 2	Ignition switch ON (with vehicle located on flat surface)	Approx. 8V (Reference)	
5, 6	16	FR & RR G sensor 2 and side G sensor		Approx. 2.5V (Reference)	
26	Body ground	Reverse lamp signal	Vehicle moving backward	Battery voltage (Approx. 12V)	Reverse lamp and circuit
			Vehicle moving forward or turning	Approx. 0V	
23		Throttle position sensor	Accelerator pedal fully depressed	Approx. 4.0V	Throttle position sensor and circuit
			Accelerator pedal fully released	Approx. 0.5V	
36		Hydraulic unit pressure switch	E-TS motor not operating	Approx. 5V	Pressure switch and circuit
			E-TS motor operating	Approx. 0V	
114		Fail-safe solenoid	Engine operating	Less than approx. 2V	Fail-safe solenoid and circuit
31		E-TS actuator relay	Engine at idle (with vehicle at rest)	Less than 2V	E-TS actuator relay and circuit

*1: Do not forcefully expand connector terminals to check voltage using circuit tester or voltmeter.
*2: 4WD warning lamp ON-OFF timing:
ON: Ignition switch ON (before engine starts) or abnormalities detected
OFF: After engine starts (with system operating normally)
*3: ABS warning lamp ON-OFF timing:
ON: Ignition switch ON (before engine starts) or abnormalities detected
OFF: After engine starts (with system operating normally)
*4: Make sure that tires are inflated to specified pressure.

Control Unit Input/Output Signal Specifications (Cont'd)

USING CONSULT

Data monitor

Indicated are the control unit computed data. If the output circuit (harness) should be open or short-circuited, correct values may be displayed.

Display	Monitor item	Data monitor			Check item (Reference)
		Condition		Specifications	
WHEEL SENSOR [km/h]	Wheel speed	Vehicle at rest		0 km/h	Wheel sensor system and circuit
		Vehicle operating*1		Identical to speedometer indication	
FF & RR G-SENSOR 1 [G]	G sensor operating condition	Vehicle at rest on flat surface		Within ±0.15G	FR & RR G sensors and circuits
FF & RR G-SENSOR 2 [G]					
SIDE G-SENSOR [G]				R or L: 0.5G or less	Side G sensor and circuit
THRTL POS SEN [V]	Throttle positioning condition	Accelerator pedal fully released		Approx. 0.5V	Throttle position sensor and circuit
		Accelerator pedal fully depressed		Approx. 4.0V	
STOP LAMP SW [ON-OFF]	Brake pedal operating condition	Brake pedal depressed		ON	Stop lamp and circuit
		Brake pedal released		OFF	
ENG SPEED SIGNAL [STOP-RUN]	Engine operating condition	Engine operating at a speed of less than 400 rpm		STOP	Engine speed signal circuit
		Engine operating at a speed of 400 rpm or above		RUN	
PRESSURE SW [ON-OFF]	Pressure switch operating condition	E-TS motor operating		ON	Pressure switch and circuit
		E-TS motor not operating		OFF	
AIR BLEED SW [ON-OFF]	Air bleed switch ON-OFF condition	Ignition switch ON	Air bleed switch removed	ON	Air bleed switch and circuit
			Air bleed switch installed	OFF	
OIL LEVEL SW [ON-OFF]	Oil level switch ON-OFF condition	E-TS hydraulic oil	Oil level within specified range	ON	Oil level switch and circuit
			Oil level too low	OFF	
OUT ABS SOLENOID [ON-OFF]	Solenoid operating condition	Actuator (solenoid) operating with (CONSULT set in active test mode) or actuator relay not operating (fail-safe system operating and before engine starts)		ON	ABS solenoid and circuit
IN ABS SOLENOID [ON-OFF]		Actuator (solenoid) not operating and actuator relay operating (with engine operating and with vehicle at rest)		OFF	
ETS SOLENOID [A]	E-TS solenoid operating condition	Vehicle at rest	Ignition switch ON	0A	E-TS actuator relay solenoid and circuit
			Engine at idle	Approx. 0.2A	
ETS F/S VALVE [A]	E-TS fail-safe solenoid operating condition	Vehicle at rest	Ignition switch ON	0A	E-TS fail-safe solenoid and circuit
			Engine at idle	Approx. 0.7A	

Control Unit Input/Output Signal Specifications (Cont'd)

Display	Monitor item	Data monitor			Check item (Reference)
		Condition		Specifications	
ABS ACTUATOR RELAY [ON-OFF]	Actuator relay operating condition	Vehicle at rest	Ignition switch ON	OFF	ABS actuator relay and circuit
			Engine operating	ON	
ABS MOTOR RELAY [ON-OFF]	Motor and motor relay operating condition	Ignition switch ON or engine operating	ABS not operating	OFF	ABS motor, motor relay and circuits
			ABS operating	ON	
ETS MOTOR [ON-OFF]	E-TS motor operating condition	E-TS motor not operating		OFF	E-TS motor relay and circuit
		E-TS motor operating		ON	
ETS/LSD RELAY [ON-OFF]	E-TS motor relay operating condition	E-TS motor not operating		OFF	
		E-TS motor operating		ON	
ETS ACTUATOR [ON-OFF]	E-TS actuator relay operating condition	Ignition switch ON and engine not operating		OFF	E-TS actuator relay and circuit
		Engine operating		ON	
WARNING LAMP [ON-OFF]	ABS warning lamp ON operation*2	ABS warning lamp ON		ON	ABS warning lamp
		ABS warning lamp OFF		OFF	
G-SEN VOLT 1 [V] G-SEN VOLT 2 [V]	Battery voltage furnished to G sensor	Ignition switch ON		Approx. 8V (Reference)	G sensor power supply circuit
BATTERY VOLT [V]	Battery voltage furnished to control unit			Approx. 12V (Battery voltage)	Control unit power supply circuit

*1: Make sure that tires are inflated to specified pressure.
*2: ABS warning lamp ON-OFF timing:
ON: Ignition switch ON (before engine starts) or abnormalities detected
OFF: After engine starts (system operating in normal condition)

Precautions for Trouble Diagnosis

- After performing trouble diagnosis, be sure to erase trouble stored in memory. Refer to "CONSULT" (next page) or "SELF-DIAGNOSIS" (BR-48).
- As for the concerns that are difficult to duplicate, move harnesses or harness connectors by hand to check if there is any poor mating of connector halves or faulty connection.
- Do not force to open a connector terminal when using a circuit tester for inspection.
- Read GI section thoroughly in advance and make sure of all the general precautions.

Basic Inspection

BASIC INSPECTION 1 — Brake fluid level and leakage

1. Check brake fluid level in reservoir tank. Replenish brake fluid if necessary.
2. Check for leakage at or around brake piping and ABS actuator. If leakage or seepage is noted, proceed as follows:

- If ABS actuator connectors are loose, tighten to specified torque. Recheck to ensure that leakage is no longer present.
- If flare nut threads at piping connectors or actuator threads are damaged, replace faulty parts with new ones. Recheck to ensure that leakage is no longer present.
- If brake fluid leaks through areas other than actuator connectors, wipe off using a clean cloth. Recheck for leakage or seepage. If necessary, replace faulty parts with new ones.
- If brake fluid leaks at or seeps through ABS actuator, wipe off using a clean cloth. Recheck for leakage or seepage. If necessary, replace ABS actuator with new one.
- Make sure that oil level (E-TS system) and oil pressure are correct, Also check that system is free from oil leakage and abnormalities.

CAUTION:
ABS actuator cannot be disassembled. Do not attempt to disassemble it.

- Make sure that battery cables are securely connected to their terminals (positive and ground), and that battery case grounding is tight. If necessary, tighten to specified torque. Check that battery voltage is not lower than specifications.

BASIC INSPECTION 2 — Loose power line terminal

Check battery terminals (positive and negative) and battery mounting (ground) for looseness.

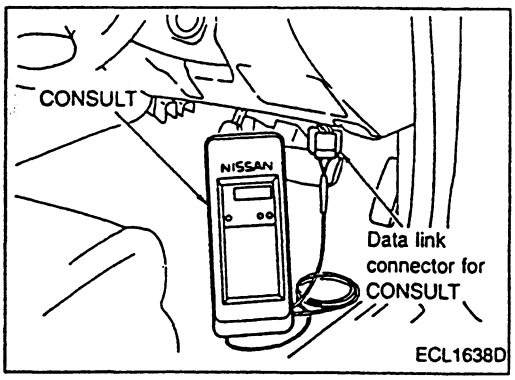
BASIC INSPECTION 3 — ABS warning lamp

1. Turn ignition switch "ON" to ensure that ABS warning lamp lights. If ABS warning lamp does not light, check ABS warning lamp circuit.
2. Make sure that 4WD warning lamp illuminates when ignition switch is turned ON. If it does not illuminate, Check 4WD warning lamp and related circuit.
3. Make sure that the 4WD and ABS warning lamps go out approximately 1 second after engine has started. If any of the warning lamps do not go out, perform self-diagnostic procedures for related system(s).
4. After driving vehicle at approx. 30 km/h for approx. 1 minute, check to ensure that 4WD warning lamp and ABS warning lamp remain off. If ABS warning lamp lights, perform self-diagnosis procedures.
5. After performing self-diagnosis procedures, be sure to erase trouble stored in memory.

CONSULT

CONTROL UNIT PART NUMBER

The part number that is shown on the control unit label and CONSULT
4-door model: 47850 AA200
2-door model: 47850 AA210



SELF-DIAGNOSIS PROCEDURE

1. Collect information on the concern from the customer, and then perform basic inspections.
2. Turn ignition switch OFF and connect CONSULT connector to data link connector for CONSULT on the vehicle.
3. Start engine and drive vehicle at approx. 30 km/h for approx. 1 minute.
4. Stop vehicle and touch "START", "ABS" and "SELF-DIAG RESULTS" sequentially on the CONSULT screen with engine running.

- **If "START" is touched immediately after engine is started or ignition switch is turned on, "ABS" may not be displayed on "SELECT SYSTEM" screen. To display "ABS", repeat the self-diagnosis procedure from the beginning.**

5. Self-diagnosis results are displayed on the screen. (Touch "PRINT" to print out the self-diagnosis results, if necessary.)

- If "NO FAIL" is displayed, inspect 4WD and ABS warning lamps. Refer to the previous page.

6. Perform appropriate inspection from the self-diagnostic results mode and repair or replace faulty parts.
7. Start engine and drive vehicle at approx. 30 km/h for approx. 1 minute.

- **Recheck to ensure that there is no other malfunction.**

8. Turn ignition switch OFF to prepare for erasing the trouble stored in memory.
9. Start engine and touch "START", "ABS", "SELF-DIAG RESULTS" and "ERASE" sequentially on the CONSULT screen to erase the trouble stored in memory.

- **If the trouble stored in memory is not erased, repeat step 6.**

10. Drive vehicle at approx. 30 km/h for approx. 1 minute and then confirm that 4WD and ABS warning lamps are off.

CONSULT (Cont'd)

SELF-DIAGNOSTIC RESULTS MODE

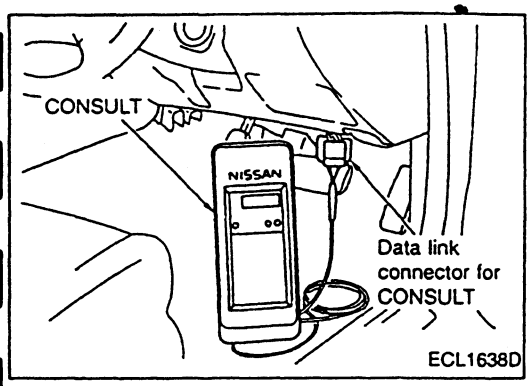
Diagnostic item	Diagnostic item is detected when...	Check item
FR RH SENSOR [OPEN]	• Input terminal voltage is abnormally high. This occurs when front right wheel sensor circuit is open or signal power supply circuit is shorted.	Wheel sensor and circuit
FR LH SENSOR [OPEN]	• Input terminal voltage is abnormally high. This occurs when front left wheel sensor circuit is open or signal power supply circuit is shorted.	
RR RH SENSOR [OPEN]	• Input terminal voltage is abnormally high. This occurs when rear right wheel sensor circuit is open or signal power supply circuit is shorted.	
RR LH SENSOR [OPEN]	• Input terminal voltage is abnormally high. This occurs when rear left wheel sensor circuit is open or signal power supply circuit is shorted.	
FR RH SENSOR [SHORT]	• Input terminal voltage is abnormally low or input signal is incorrect. This occurs when front right wheel sensor circuit is shorted, signal circuit is shorted to ground or front right wheel sensor-to-rotor clearance is abnormally wide.	
FR LH SENSOR [SHORT]	• Input terminal voltage is abnormally low or input signal is incorrect. This occurs when front left wheel sensor circuit is shorted, signal circuit is shorted to ground or front left wheel sensor-to-rotor clearance is abnormally wide.	
RR RH SENSOR [SHORT]	• Input terminal voltage is abnormally low or input signal is incorrect. This occurs when rear right wheel sensor circuit is shorted, signal circuit is shorted to ground or rear right wheel sensor-to-rotor clearance is abnormally wide.	
RR LH SENSOR [SHORT]	• Input terminal voltage is abnormally low or input signal is incorrect. This occurs when rear left wheel sensor circuit is shorted, signal circuit is shorted to ground or wheel sensor-to-rotor clearance is abnormally wide.	
FR RH IN ABS SOL / FR RH OUT ABS SOL [OPEN]	• Output terminal voltage is abnormally lower than controlled value when either front right wheel ABS solenoid circuit is open or control circuit is shorted to ground.	ABS solenoid and circuit
FR LH IN ABS SOL / FR LH OUT ABS SOL [OPEN]	• Output terminal voltage is abnormally lower than controlled value when either front left wheel ABS solenoid circuit is open or control circuit is shorted to ground.	
REAR IN ABS SOL / REAR OUT ABS SOL [OPEN]	• Output terminal voltage is abnormally lower than controlled value when either rear wheel ABS solenoid circuit is open or control circuit is shorted to ground.	
FR RH IN ABS SOL / FR RH OUT ABS SOL [SHORT]	• Output terminal voltage is abnormally higher than controlled value when either front right wheel ABS solenoid circuit is shorted or control circuit is shorted to power supply circuit.	
FR LH IN ABS SOL / FR LH OUT ABS SOL [SHORT]	• Output terminal voltage is abnormally higher than controlled value when either front left wheel ABS solenoid circuit is shorted or control circuit is shorted to power supply circuit.	
REAR IN ABS SOL / REAR OUT ABS SOL [SHORT]	• Output terminal voltage is abnormally higher than controlled value when either rear wheel ABS solenoid circuit is shorted or control circuit is shorted to power supply circuit.	
ABS MOTOR [ON FAILURE]	• While ABS motor is being controlled to be set to OFF, it turns ON.	ABS motor, motor relay and circuit
ABS MOTOR [OFF FAILURE]	• While ABS motor is being controlled to be set to ON, it turns ON.	
ABS ACTUATOR RELAY [ON FAILURE]	• While ABS actuator relay is being controlled to set to OFF, it turns ON.	ABS actuator relay and circuit
ABS ACTUATOR RELAY [OFF FAILURE]	• While ABS actuator relay is being controlled to set to ON, it turns OFF.	
BATTERY VOLTAGE [VB-HIGH]	• E-TS/ABS control unit power supply voltage is abnormally high.	Control unit power supply circuit
BATTERY VOLTAGE [VB-LOW]	• E-TS ABS control unit power supply voltage is abnormally low.	

CONSULT (Cont'd)

Diagnostic item	Diagnostic item is detected when...	Check item
FR & RR G-SEN 1 [ABNORMAL]	• FR & RR G sensor 1 output is abnormally higher or lower than specifications.	G sensor and circuit
FR & RR G-SEN 2 [ABNORMAL]	• FR & RR G sensor 2 output is abnormally higher than specifications.	
FR & RR G-SEN 1, 2 [ABNORMAL]	• Output voltage difference between FR & RR G sensors 1 and 2, which is abnormally higher than specified value, has continued for a certain period.	
G-SEN VOLT 1 [ABNORMAL]	• FR & RR G sensor 1 power supply voltage, which is abnormally higher than, or lower than specifications, has continued for a certain period of time.	
G-SEN VOLT 2 [ABNORMAL]	• FR & RR G sensor 2 power supply voltage, which is abnormally higher than, or lower than specifications, has continued for a certain period of time.	
SIDE G-SENSOR [ABNORMAL]	• Side G sensor output voltage, which is abnormally higher than, or lower than specifications, has continued for a certain period of time.	
AIR BLEED SW	• Air bleed switch has been turned ON for a certain period of time during vehicle operation.	Air bleed switch and circuit
THROTTLE POSI SEN	• Throttle position sensor signal voltage, which is 0V or abnormally higher than specifications, has continued for a certain period of time.	Throttle position sensor and circuit
OIL LEVEL SW	• Oil level switch has been turned OFF (oil level too low) for a certain period of time.	Oil level switch and circuit
PRESSURE SW [ON FAILURE]	• Pressure switch has been turned ON for an extended period of time.	Pressure switch and circuit
PRESSURE SW [OFF FAILURE]	• Pressure switch has been turned OFF for an extended period of time although current flows through E-TS solenoid. Or, it has been turned OFF only for a short period of time (due to pressure switch in dummy contact with other parts (dummy circuit setup) or gas pressure drop).	
ETS MOTOR [ON FAILURE]	• While E-TS motor is being controlled to be set to OFF, E-TS motor control terminal voltage does not become 0 volts (ground potential). (E-TS motor relay is ON all the time, motor circuit is open, etc.)	E-TS motor and circuit
ETS MOTOR [OFF FAILURE]	• While E-TS motor is being controlled to be set to ON, E-TS motor control terminal voltage is not present.	
ETS SOLENOID [OPEN]	• Specified voltage is not applied to E-TS solenoid control terminal (open solenoid circuit, etc.).	E-TS relay, solenoid and circuits
ETS SOLENOID [SHORT]	• E-TS solenoid control terminal voltage is abnormal (shorted E-TS solenoid circuit, etc.).	
ETS SOLENOID [ABNORMAL]	• Current flow through E-TS solenoid is abnormally larger or smaller than specifications.	
ETS F/S VALVE [OPEN]	• E-TS fail-safe valve control terminal voltage is abnormally high or low (open fail-safe valve circuit, etc.).	E-TS fail-safe system, solenoid and circuits
ETS F/S VALVE [SHORT]	• E-TS fail-safe valve control terminal voltage is abnormally high or low (shorted fail-safe valve circuit, etc.).	
ETS F/S VALVE [ON FAILURE]	• While E-TS fail-safe valve is being controlled to be set to OFF, it turns ON.	
CONTROL UNIT	• Abnormalities occur in E-TS/ABS control unit process function.	Control unit power supply circuit
ABS MOTOR [ABNORMAL WHEEL LOCKING]	• ABS motor speed is abnormally low.	ABS motor, motor relay and circuits

NOTE:
- 4WD and ABS warning lamps illuminate. "Self-diagnosis could not detect any malfunctions" can sometimes appear on CONSULT display as a diagnostic result. When it occurs, check engine speed signal circuit.
- If "ABS" does not appear on system selection screen, check ABS control unit for improper operation and diagnosis connector circuit condition. Also confirm that CONSULT card No. is suitable for use with ABS system.

CONSULT (Cont'd)



DATA MONITOR PROCEDURE

- Refer to CONSULT Instruction Manual for details on data monitor function.

1. Turn ignition switch OFF.
2. Connect CONSULT connector to data link connector for CONSULT.
3. Turn ignition switch ON.
4. Touch "START" on CONSULT screen.
5. Touch "ABS" on CONSULT screen.

- **If "START" is touched immediately after engine is started or ignition switch is turned on, "ABS" may not be displayed on "SELECT SYSTEM" screen. To display "ABS", repeat the data monitor procedure from the beginning.**

6. Touch "DATA MONITOR".
7. Touch "SETTING" to set recording condition.
8. Touch "LONG TIME" and then "ENTER".
9. Return to "SELECT MONITOR ITEM" screen and touch "ALL SIGNALS".
10. Touch "START".
11. Display data monitor.
12. If necessary, sequentially touch "REC START", "REC STOP", "DATA DISPLAY", "NUMBER PRINT" and "PRINT" to print out the data.

CONSULT (Cont'd)

DATA MONITOR MODE

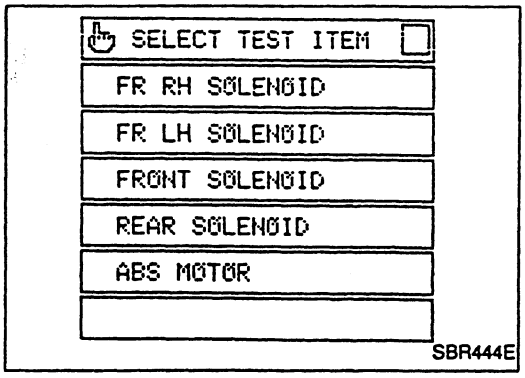
Display	Select monitor item			Remarks
	ECM input signals	All signals	Selection from menu	
FR RH SEN [km/h]	○	○	○	Vehicle speed, which is processed from front right wheel sensor signal, appears on display.
FR LH SEN [km/h]	○	○	○	Vehicle speed, which is processed from front left wheel sensor signal, appears on display.
RR RH SEN [km/h]	○	○	○	Vehicle speed, which is processed from rear right wheel sensor signal, appears on display.
RR LH SEN [km/h]	○	○	○	Vehicle speed, which is processed from rear left wheel sensor signal, appears on display.
FR & RR G SEN1 [+/–] [G]	○	○	○	G value, which is processed from FR & RR G sensor 1 signal, appears on display.
FR & RR G SEN2 [+/–] [G]	○	○	○	G value, which is processed from FR & RR G sensor 2 signal, appears on display.
SIDE G SEN [L/R] [G]	○	○	○	G value, which is processed from side G sensor signal, appears on display.
THRTL POS SEN [V]	○	○	○	Signal voltage sent from throttle position sensor appears on display.
STOP LAMP SW [ON-OFF]	○	○	○	Stop lamp switch ON-OFF condition appears on display.
ENG SPEED SIG [RUN/STOP]	○	○	○	Engine speed, which is based on camshaft position sensor signal, appears on display.
PRESSURE SW [ON/OFF]	○	○	○	Pressure switch ON-OFF condition, which is determined from pressure switch signal, appears on display.
AIR BLEED SW [ON-OFF]	○	○	○	Air bleed switch ON-OFF condition, which is determined from air bleed switch signal, appears on display.
OIL LEVEL SW [ON-OFF]	○	○	○	Oil level switch ON-OFF condition, which is determined from oil level switch signal, appears on display.
F/R IN SOL [ON-OFF]	—	○	○	Control condition (ON-OFF) of front right wheel IN ABS solenoid appears on display.
F/R OUT SOL [ON-OFF]	—	○	○	Control condition (ON-OFF) of front right wheel OUT ABS solenoid appears on display.
F/L IN SOL [ON-OFF]	—	○	○	Control condition (ON-OFF) of front left wheel IN ABS solenoid appears on display.
F/L OUT SOL [ON-OFF]	—	○	○	Control condition (ON-OFF) of front left wheel OUT ABS solenoid appears on display.
REAR IN SOL [ON-OFF]	—	○	○	Control condition (ON-OFF) of rear wheel IN ABS solenoid appears on display.
REAR OUT SOL [ON-OFF]	—	○	○	Control condition (ON-OFF) of rear wheel OUT ABS solenoid appears on display.
ETS SOLENOID [A]	—	○	○	Current flow through E-TS solenoid appears on display.
ETS F/S VALVE	—	○	○	Control condition (ON-OFF) of E-TS fail-safe valve appears on display.
ABS ACTUATOR [ON-OFF]	—	○	○	ABS actuator relay condition (ON-OFF) appears on display.
ABS MOTOR [ON-OFF]	—	○	○	ABS motor relay condition (ON-OFF) appears on display.
ETS MOTOR [ON-OFF]	—	○	○	E-TS motor condition (ON-OFF) appears on display.
ETS RELAY [ON-OFF]	—	—	○	E-TS motor relay condition (ON-OFF) appears on display.
ETS ACTUATOR [ON-OFF]	—	—	○	E-TS actuator relay condition (ON-OFF) appears on display.
WARNING LAMP [ON-OFF]	—	○	○	Control condition of ABS warning lamp appears on display.
G-SEN VOLT1 [V]	○	—	○	Voltage furnished from E-TS/ABS control unit appears on display.
G-SEN VOLT2 [V]	○	—	○	Voltage furnished from E-TS/ABS control unit appears on display.
BATTERY VOLT [V]	○	—	○	Voltage furnished from E-TS/ABS control unit appears on display.
VOLTAGE [V]	—	—	○	Value measured with voltage probe appears on display.
PULSE [msec] or [Hz] or [%]	—	—	○	Refer to CONSULT Operation Manual.

CONSULT (Cont'd)

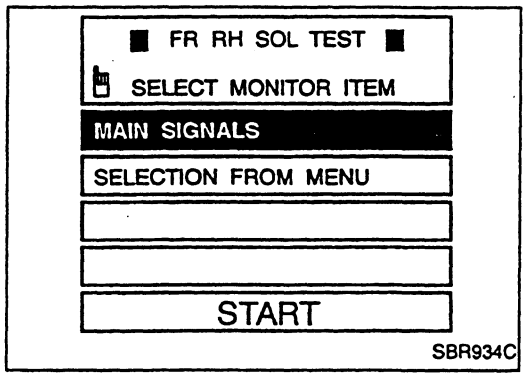
ACTIVE TEST PROCEDURE

- When conducting Active test, vehicle must be stationary.
- Confirm that brakes have been bled completely.
- When ABS warning lamp stays on, never conduct Active test.

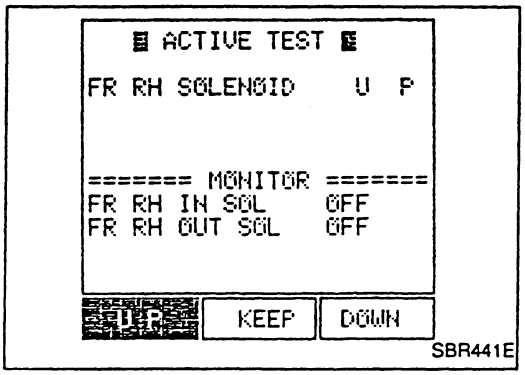
1. Connect CONSULT to Data Link Connector for CONSULT and start engine.
2. Touch "START" on CONSULT screen.
3. Touch "ABS", then "ACTIVE TEST".
4. "SELECT TEST ITEM" screen is displayed.



5. Select active test item by touching screen.



6. Touch "START" on condition that "MAIN SIGNALS" item is highlighted.



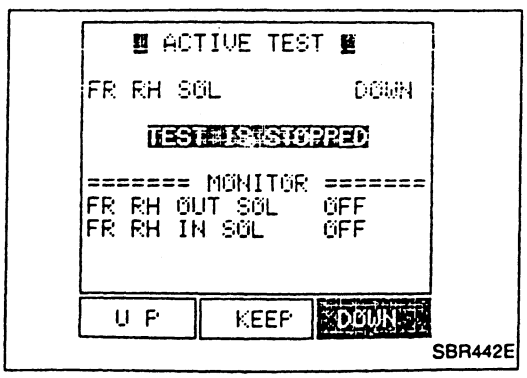
7. "ACTIVE TEST" screen is displayed.

ABS solenoid valve

- To check that ABS solenoid valves (inlet and outlet) operate in the following manner, touch "UP", "KEEP" and "DOWN" on the screen while observing the monitor.

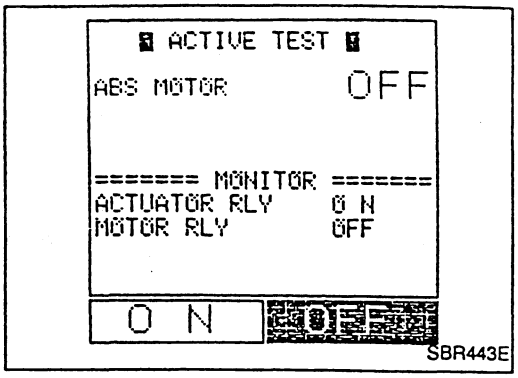
Operation	UP	KEEP	DOWN
IN ABS S/V	OFF	ON	ON
OUT ABS S/V	OFF	OFF	ON*

*: Solenoid valve stays ON for 1 to 2 seconds after touching the key, and then turns OFF.



- If the active test is conducted with brake pedal depressed, the brake pedal travel limit may change. This is a normal condition.
- "TEST IS STOPPED" message is displayed 10 seconds after the operation is started.
- If the active test needs to be performed again after "TEST IS STOPPED" is displayed, repeat step 6.

CONSULT (Cont'd)



ABS motor

- Touch "ON" and "OFF" on the screen to check that ABS motor relay and ABS actuator relay operate as follows:

Operation	ON	OFF
ABS actuator relay	ON	ON
ABS motor relay	ON	OFF

- If the active test is conducted with brake pedal depressed, the brake pedal travel limit may change. This is a normal condition.
- "TEST IS STOPPED" message is displayed 10 seconds after the operation is started.

Self-diagnosis

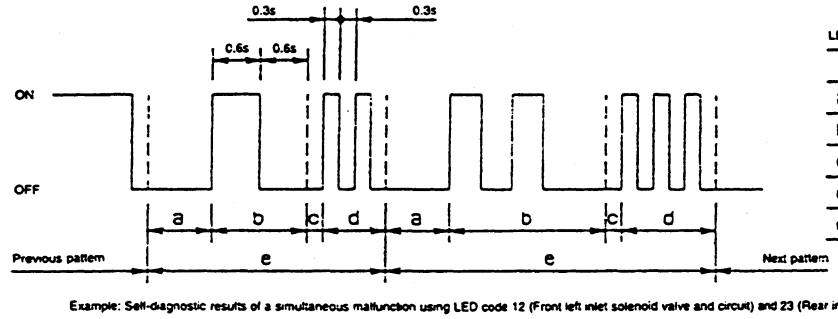
SELF-DIAGNOSIS PROCEDURE

1. Drive vehicle at 30 km/h for at least 1 minute. Bring vehicle to a full stop. Do not turn off engine. Look at LED at top of control unit (red lamp). Note the number of times it blinks ON and OFF.
- If two or more systems are malfunctioning, all warning lamps will blink ON and OFF.

2. After completing required maintenance procedures, be absolutely sure to erase results of self-diagnostic testing from memory. Refer to "HOW TO ERASE SELF-DIAGNOSTIC RESULTS (Malfunction codes)".
3. Once again, drive vehicle at 30 km/h for at least 1 minute. Check that 4WD warning lamp and ABS warning lamp are OFF.

CONTROL UNIT LED (RED LAMP) INDICATION

- Control unit LED will blink ON and OFF. Readings are based on frequency of 10th digit and unit digit. Refer to the figure below.
- If there are multiple problems, all problems appear on display in sequence.
- Indication pattern will repeat all of the trouble codes in sequence.



LED code indication timing

	Indication description	Indication time
a	Time interval between previously indicated code and currently indicated code	3.0 S
b	Tenth digit of currently indicated code	0.6 S × (0~7)
c	Time interval between tenth digit and unit digit of malfunction code	0.3 S
d	Unit digit of malfunction code	0.3 S × (1~8)
e	Indication pattern of 1 cycle (a-b-c-d)	3.9 S~ 15.9 S

Example: Self-diagnostic results of a simultaneous malfunction using LED code 12 (Front left inlet solenoid valve and circuit) and 23 (Rear inlet solenoid valve and circuit)

BRG0779D

HOW TO ERASE SELF-DIAGNOSTIC RESULTS (Malfunction codes)

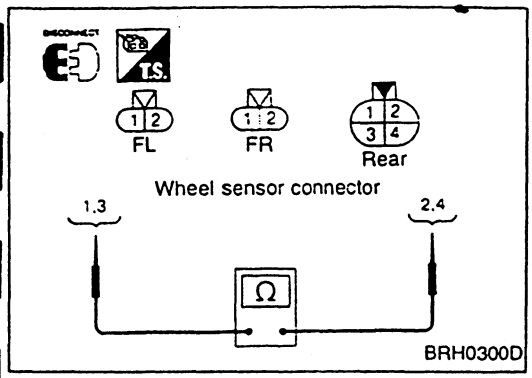
- Remove cables from battery terminals. Also remove E-TS/ABS control unit connectors.
- Using CONSULT, touch "ERASE" on CONSULT display. This will erase malfunction information from memory.

Self-diagnosis (Cont'd)

MALFUNCTION CODE/SYMPTOM CHART

Number of LED blinks	Malfunctioning part	Detecting timing		Warning lamps ON		Fail-safe operation
		When starting engine	Vehicle driving	ABS	4WD	
0	Normal	—	—	—	—	—
	Engine speed signal and circuit	○	○	○	○	○
1, 5	Front right wheel sensor and circuit	○*1	○	○	○	○
2, 6	Front left wheel sensor and circuit	○*1	○	○	○	○
3, 7	Rear right wheel sensor and circuit	○*1	○	○	○	○
4, 8	Rear left wheel sensor and circuit	○*1	○	○	○	○
11, 21	Front right inlet solenoid valve and circuit	○	○	○	—	○
12, 22	Front left inlet solenoid valve and circuit	○	○	○	—	○
13, 23	Rear inlet solenoid valve and circuit	○	○	○	—	○
15, 25	Front right outlet solenoid valve and circuit	○	○	○	—	○
16, 26	Front left outlet solenoid valve and circuit	○	○	○	—	○
17, 27	Rear outlet solenoid valve and circuit	○	○	○	—	○
31, 32, 33	E-TS solenoid and circuit	○	○	—	○	○
34, 35, 36	E-TS fail-safe solenoid and circuit	○	○	—	○	○
41, 42	ABS actuator relay and circuit	○	○	○	—	○
43, 44	ABS actuator motor, motor relay and circuit	○	○	○	—	○
45, 46, 77	E-TS/ABS control unit, ground and circuit	○	○	○	○	○
47, 48	E-TS/ABS control unit power supply and circuit	○	○	○	—	○
51, 52	E-TS actuator motor and circuit	○	○	—	○	○
53, 54	Pressure switch and circuit	○	○	—	○	○
55	Air bleed switch and circuit	—	○	—	○*2	○
56	E-TS oil level switch and circuit	○	○	—	○	○
61	FR & RR G sensor 1 and circuit	○	○	○	○	○
62	FR & RR G sensor 2 and circuit	○	○	○	○	○
63	FR & RR G sensor 1 or 2 and circuit	○	○	○	○	○
64	G sensor 1 power supply and circuit	○	○	○	○	○
65	G sensor 2 power supply and circuit	○	○	○	○	○
66	Side G sensor and circuit	○	○	○	○	○
75	Throttle position sensor and circuit	○	○	—	○	○

*1: Shorted sensor circuits cannot be detected during engine starting, but during vehicle operation.
*2: Normal control is performed during vehicle operation although 4WD warning lamp illuminates.



Component Parts Inspection

WHEEL SENSOR

RESISTANCE MEASUREMENT
Remove connector from wheel sensor and measure resistance between related terminals.
Terminals ① - ②, ③ - ④: 0.6 - 3.25 kΩ

NG → Wheel sensor is faulty.

OK ↓

SENSOR HARNESS DUMMY OPEN-CIRCUIT INSPECTION
Remove connector from wheel sensor and measure resistance between terminals as outlined below:
Front: Turn steering wheel to left and right and shake sensor harness inside wheelhouse by hand while measuring resistance between terminals. Make sure that resistance is within specifications and does not change.
Rear: Shake final drive sensor harness by hand while measuring resistance. Make sure that resistance is within specifications and does not change.
Terminals ① - ②, ③ - ④: 0.6 - 3.25 kΩ

NG → Wheel sensor is faulty.

OK ↓

WHEEL SENSOR INSPECTION
Check to make sure that wheel sensor's tip end (pick-up) is clean and free from foreign matter (metal chips or filings).

NG → Clean wheel sensor.

OK ↓

WHEEL SENSOR INSPECTION
Check wheel sensor and harness for scratches which affect performance.

NG → Wheel sensor is faulty.

OK ↓

SENSOR ROTOR INSPECTION
Check sensor rotor for broken teeth or foreign matter (caught in teeth).

NG → Clean or replace sensor rotor.

OK ↓

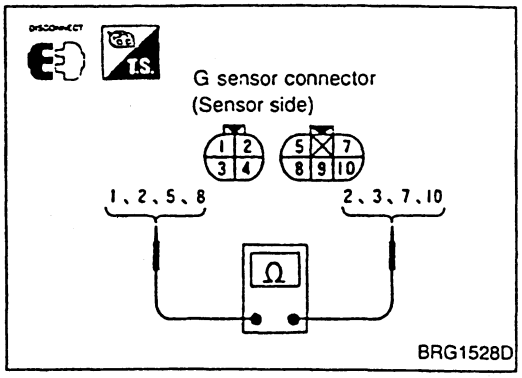
INSTALLATION CONDITION INSPECTION
Check wheel sensor for improper installation (free play, etc.).

NG → Eliminate sensor free play.

OK ↓

Wheel sensor is in good order.

Component Parts Inspection (Cont'd)



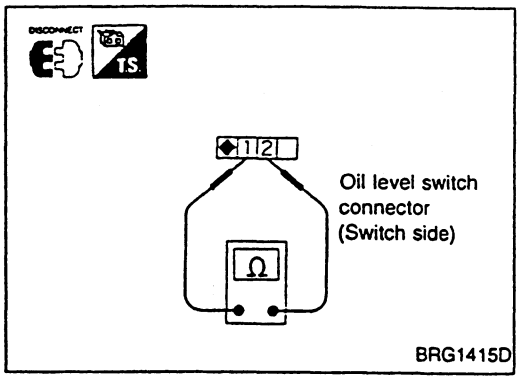
G SENSOR

Remove connector and measure resistance between terminals affected.

Terminals ① - ②, ② - ③, ⑤ - ⑦, ⑩ - ⑧:
Resistance must exist in one direction only.

CAUTION:

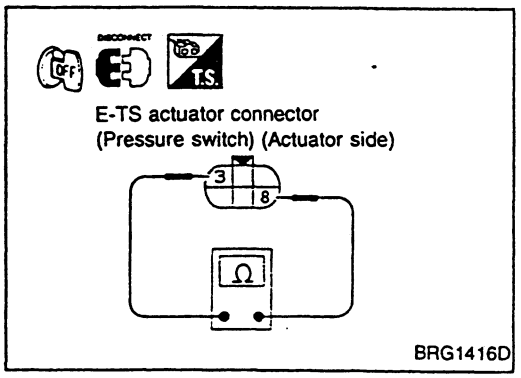
- **Make sure that circuit tester is set to 1 MΩ range.**
- **Be sure to set G sensor level during measurements.**



OIL LEVEL SWITCH

Remove oil level switch connector and check continuity between terminals ① and ②.

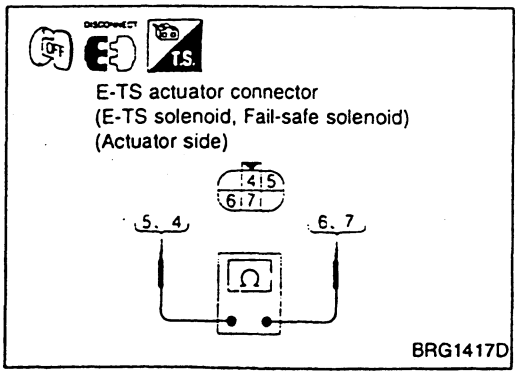
Reservoir tank oil level is normal:
Continuity exists.
Reservoir tank oil level is too low:
Continuity does not exist.



E-TS ACTUATOR

Pressure switch

- Remove pressure switch connector and check continuity between terminals ③ and ⑧.
 Accumulator internal pressure decreasing to approximately 2.6 MPa (27.0 kg/cm²) or less:
 Continuity exists.
 Accumulator internal pressure increasing to approximately 3.8 MPa (39.0 kg/cm²):
 Continuity does not exist.
- Immediately after E-TS actuator motor has stopped, accumulator internal pressure is high. Continuity does not exist.
- Accumulator internal pressure increases while actuator motor is operating. Accumulator internal pressure decreases when actuator motor is at rest.



E-TS solenoid and fail-safe solenoid

Remove connectors from E-TS, A-LSD and fail-safe solenoids. Measure resistance between individual connector terminals listed below:

E-TS solenoid terminals ⑤ and ⑥: Approx. 6Ω
Fail-safe solenoid terminals ④ and ⑦: Approx. 11Ω

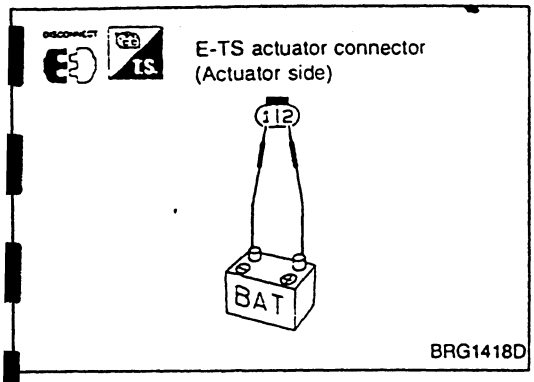
Component Parts Inspection (Cont'd)

E-TS motor

Remove connector from motor. Apply battery voltage across terminals ① and ② to make sure that motor starts.

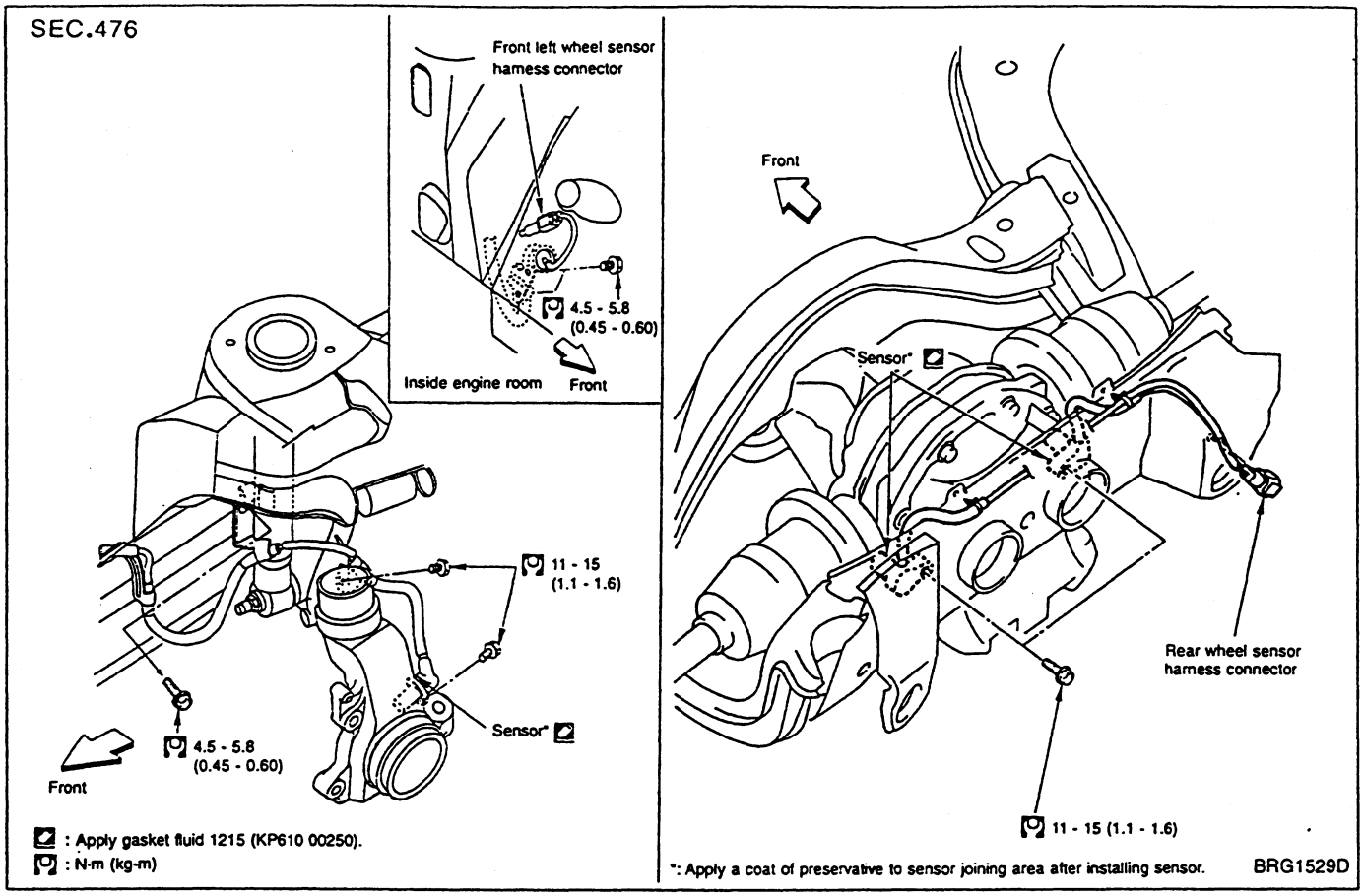
CAUTION:

To avoid motor overheating, do not apply battery voltage for more than 5 seconds at a time.



Component Parts Removal and Installation

SENSOR



Removal

1. Remove sensor harness connectors and brackets.
2. Remove sensor securing bolts, then remove sensors from vehicle.

CAUTION:
Carefully remove sensors. Do not attempt to turn sensors or do not forcefully pull sensor harnesses.

Component Parts Removal and Installation (Cont'd)

Installation

Front side

1. Check to make sure that the following sensor areas are clean and free from foreign matter (metal chips, filings, etc.): pick-up area, mounting hole inner wall and rotor mating surface. If necessary, clean sensor before installation.
2. Apply a coat of gasket fluid 1215 (KP610 00250) to joining surfaces of sensor and steering knuckle before installation. Tighten sensor securing bolts to specified torque.

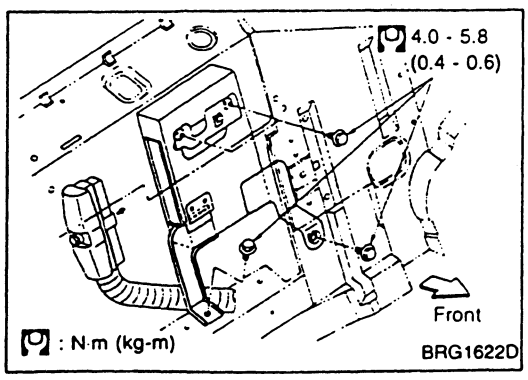
CAUTION:

- **If previous sensor is to be re-installed, adjust sensor-to-rotor clearance in advance so that it is as small as possible.**
- **Front sensor, which has a thin rubber coat film on its end worn, may be fit for re-use.**
- **Front sensor whose thin rubber coat film is in contact with its rotor, may also be re-used.**

3. Apply a coat of preservative to sensor joining area.
4. Install sensor harness bracket and tighten securing bolts to specified torque.
5. Connect sensor harness connector to its mating part inside engine room.

Rear side

1. Make sure that the pick-up area, mounting hole inner wall and rotor mating surface are clean and free from foreign matter (metal chips, filings, etc.).
 If necessary, clean sensor before installation.
2. Apply a coat of gasket fluid 1215 (KP610 00250) to joining surfaces of sensor and steering knuckle before installation. Tighten sensor securing bolts to specified torque.
3. Apply a coat of preservative to sensor joining area.
4. Install sensor harness bracket and tighten securing bolts to specified torque.
5. Install sensor harness connector to its mating part inside engine room.



E-TS/ABS CONTROL UNIT

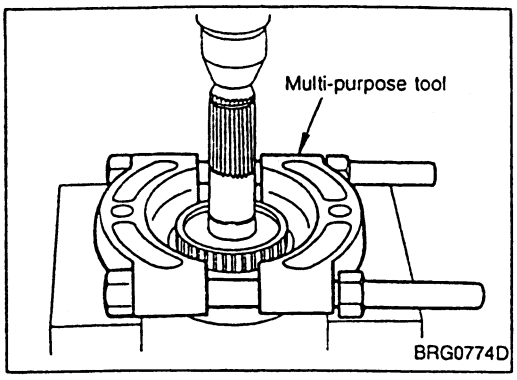
Removal

1. Remove rear seats and rear seatback support panel.
2. Remove control unit securing bolts.
3. Remove front trunk finisher.
4. Remove control unit connector.

Installation

Installation is in the reverse order of removal.

Component Parts Removal and Installation (Cont'd)



SENSOR ROTOR

Removal

Front side

Remove front sensor rotor.

Rear side

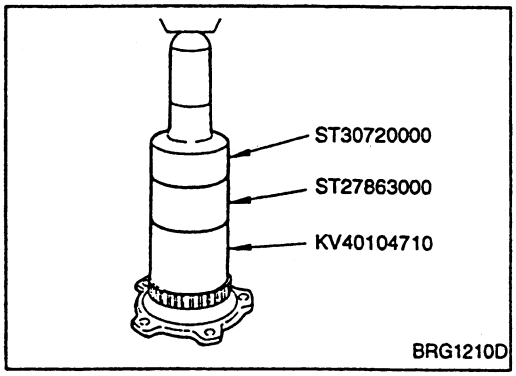
Remove rear sensor rotor as follows:

1) Remove side flange.
2) Using bearing pulling attachment (multi-purpose tool) and press, remove sensor rotor.

Installation

Front side

Install front sensor rotor.



Rear side

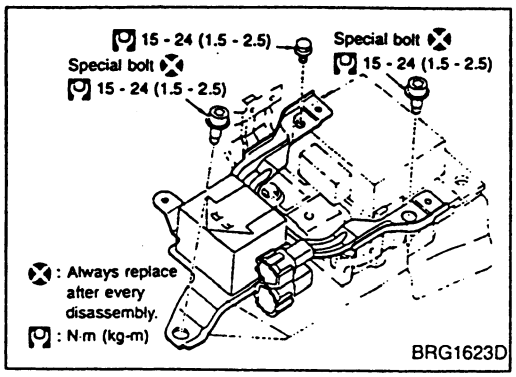
Install rear sensor rotor as follows:

1) Using drift (special service tool), press rear sensor rotor into side flange.
2) Install side flange.

CAUTION:

When installing new rear sensor rotors, refer to the following table as a guide.

No. of sensor rotor teeth:
Front: 46
Rear: 46



G SENSOR

Removal

1. Remove console box.
2. Remove connector from G sensor.
3. Remove G sensor securing bolts, then G sensor.

CAUTION:

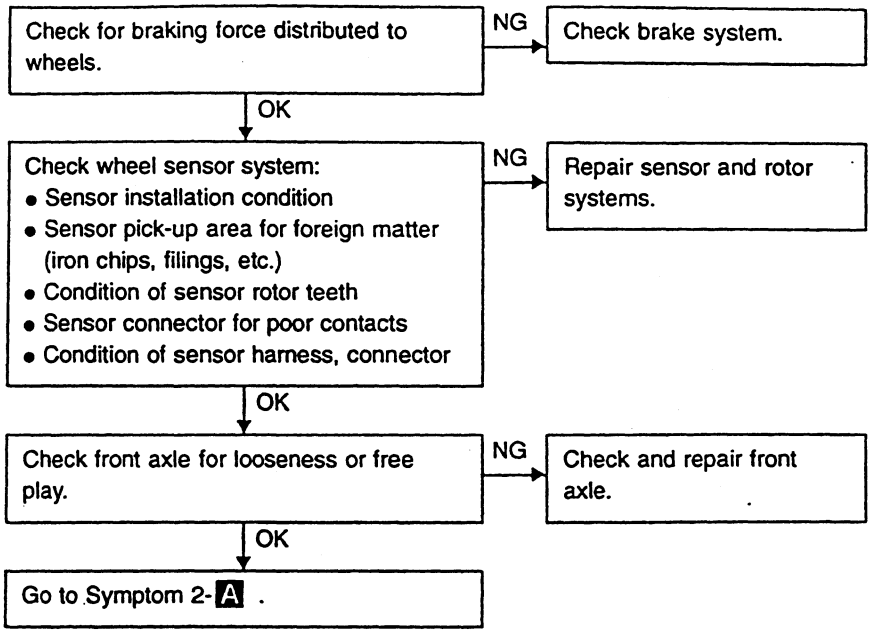
G sensor easily breaks. Be extremely careful not to bump or drop it.

Installation

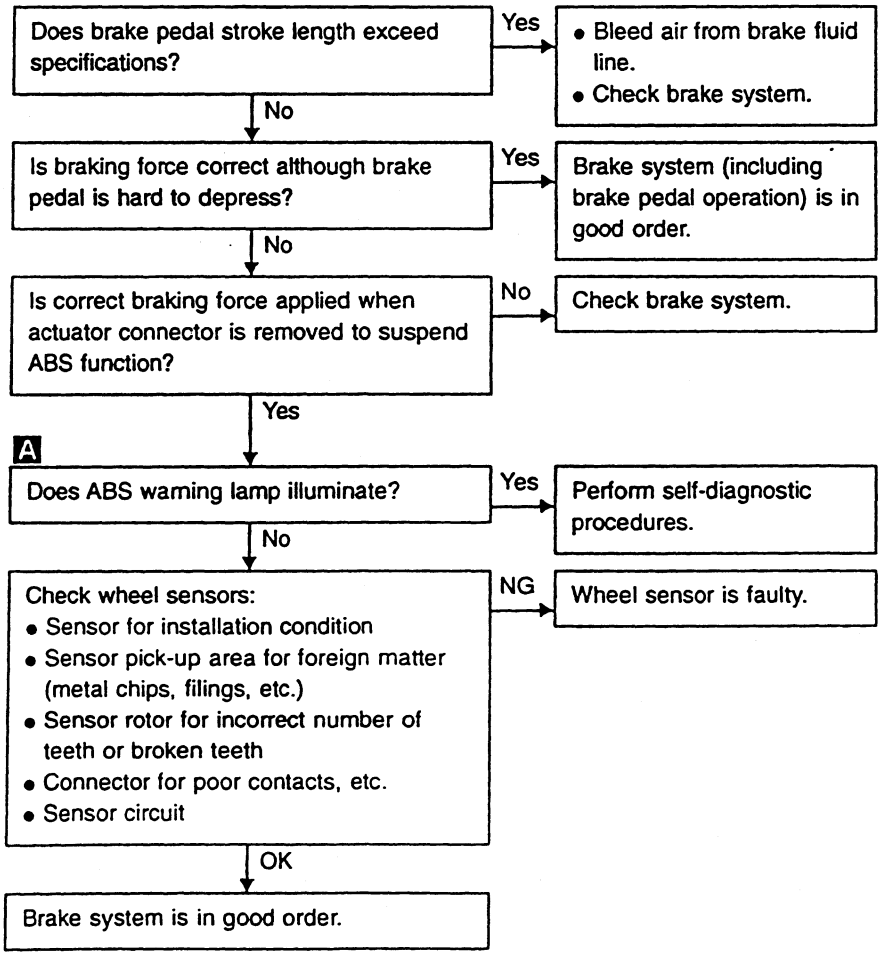
Installation is in the reverse order of removal.

Trouble Diagnoses by Symptom

SYMPTOM 1 — ABS works frequently.



SYMPTOM 2 — Unexpected pedal action



Trouble Diagnoses by Symptom (Cont'd)

SYMPTOM 3 — Long stopping distance

Is stopping distance longer on snow-covered or gravel roads than on paved roads?
- Yes → Stopping distance of ABS-equipped vehicle is sometimes longer than vehicle without ABS.
- No ↓

Does stopping distance still remain longer than vehicle without ABS after removing actuator connector to suspend ABS function?
- Yes → • Bleed air from brake system. • Check brake system.
- No ↓

Go to Symptom 2-A .

SYMPTOM 4 — ABS does not work.

Does ABS warning lamp illuminate?
- Yes → Perform self-diagnostic procedures to locate the cause of problem.
- No ↓

Does ABS effectively operate at speeds of less than 10 km/h only?
- No → ABS is in good order.
- Yes ↓

Go to Symptom 2-A .

SYMPTOM 5 — Pedal vibration and noise

Does brake pedal vibration/noise occur during engine starting?
- Yes → Perform self-diagnostic procedures to locate the cause of problem.
- No ↓

Does brake pedal vibration/noise occur only when brake pedal is slightly depressed?
CAUTION:
ABS sometimes operates under any of the following conditions where wheel speed variation occurs.
- **During gearshift operation**
- **During clutch pedal operation**
- **Driving over bumps or gutters (50-mm high or deep) at 50 km/h or above.**
- **During standing starts (immediately after starting engine)**

- Yes → ABS is in good order.
- No ↓

Does brake pedal vibration/noise occur during normal vehicle operation?
CAUTION:
ABS sometimes operates except for sudden braking operation under any of the following conditions.
- **During low "μ" road driving.**
- **Turning curves at high speed**
- **Riding over bumps**

- Yes → ABS is in good order.
- No ↓

Ⓐ

Trouble Diagnoses by Symptom (Cont'd)

Ⓐ

Does vibration/noise occur when engine rpms are increased with vehicle at rest?

Yes → ABS is in good order. **When vehicle is at rest, vibration/noise can sometimes occur.**

No

Does vibration/noise occur when switches (related to electrical components) are activated?

Yes → Check sensor harness and shielding ground circuit.

No

Go to Symptom 2-A .

SYMPTOM 6 — ABS warning lamp does not illuminate.

BURNED-OUT ABS WARNING LAMP BULB INSPECTION
Check continuity between meter power supply terminal and ABS warning lamp terminal.

NG → ABS warning lamp or internal combination meter circuit is faulty.

OK

ABS WARNING LAMP POWER SUPPLY CIRCUIT INSPECTION
Remove meter connector. Make sure the voltage between vehicle harness terminal and body ground is approx. 12V.

NG →
- Check 10A fuse.
- Check fuse block-to-meter harness and connectors.
- Check power supply system (battery, ignition switch and circuits).

OK

ABS ACTUATOR (AS A SINGLE PART) INSPECTION

NG → ABS actuator is faulty.

OK

ABS WARNING LAMP HARNESS CIRCUIT INSPECTION
- Remove actuator connector, control unit connector and meter connector.
- Check for shorted or open E-TS/ABS-to-control unit harness circuit.

NG → Harness is faulty.

OK

ABS WARNING LAMP CONNECTOR CIRCUIT INSPECTION
Check control unit, ABS actuator and meter and vehicle harness connectors*.

NG → Connector is faulty.

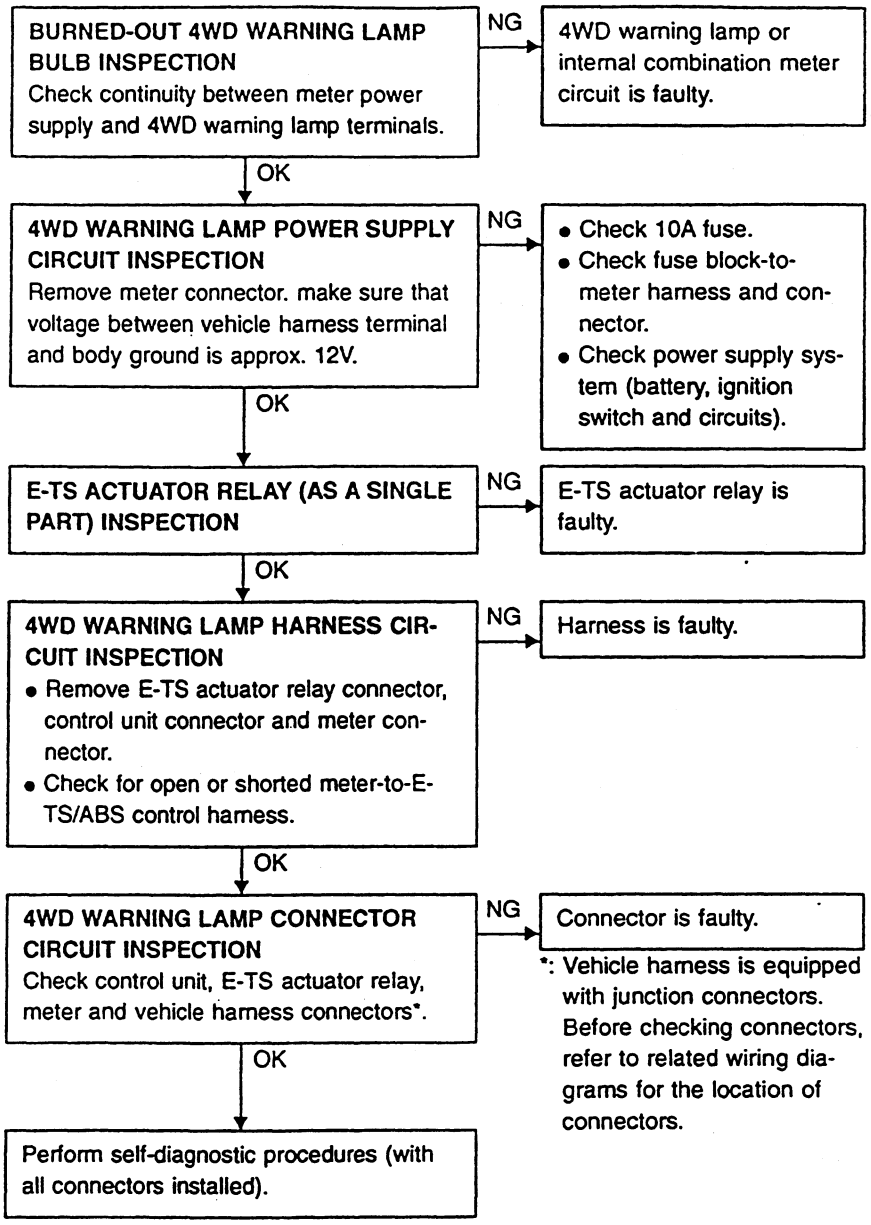
OK

Perform self-diagnostic procedures (with connectors installed).

*: Vehicle harness is equipped with junction connectors. Before checking connectors, refer to related wiring diagrams for the location of these connectors.

Trouble Diagnoses by Symptom (Cont'd)

SYMPTOM 7 — 4WD warning lamp does not illuminate.



*: Vehicle harness is equipped with junction connectors. Before checking connectors, refer to related wiring diagrams for the location of connectors.

STEERING SYSTEM

SECTION ST

MODIFICATION NOTICE:
Super HICAS has been changed.

CONTENTS

ELECTRIC SUPER HICAS 2
- Pre-inspection 2
- System Description 2
- Component Parts Location 3
- Circuit Diagram 4
- Control Unit Input/Output Signal Specifications 5
- Preliminary Check 7
- Trouble Diagnosis with CONSULT 7
- Trouble Diagnosis with Self-diagnosis 11
- Symptom Chart 13

Pre-inspection

INSPECTION BEFORE DRIVING

- Check fluid leakage from power steering components (gear, pump, piping, etc.), and check whether the fluid level is within the proper range.
- Check whether tire size and inflation pressure are within the specified limits. Check also whether the steering wheel is a genuine part, and whether a non-genuine control unit is attached.
- Check whether wheel alignment is within the specified limits.
- Check whether suspension system is modified, and whether the modification, if any, has increased the vehicle weight.

INSPECTION DURING DRIVING

- Check facts about trouble.
- Check whether the engine is running in good condition.

System Description

This system contains two functions for SUPER HICAS: self-diagnosis function and fail-safe function.
For self-diagnosis function, refer to "SELF-DIAGNOSIS PROCEDURE" on pages ST-7 and ST-11.

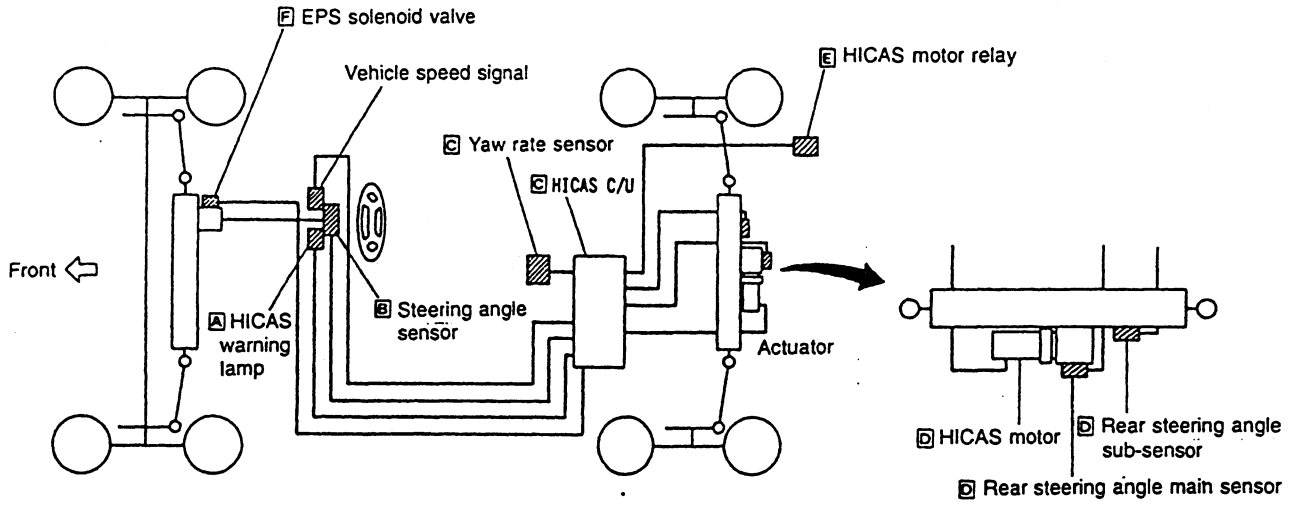
FAIL-SAFE FUNCTION

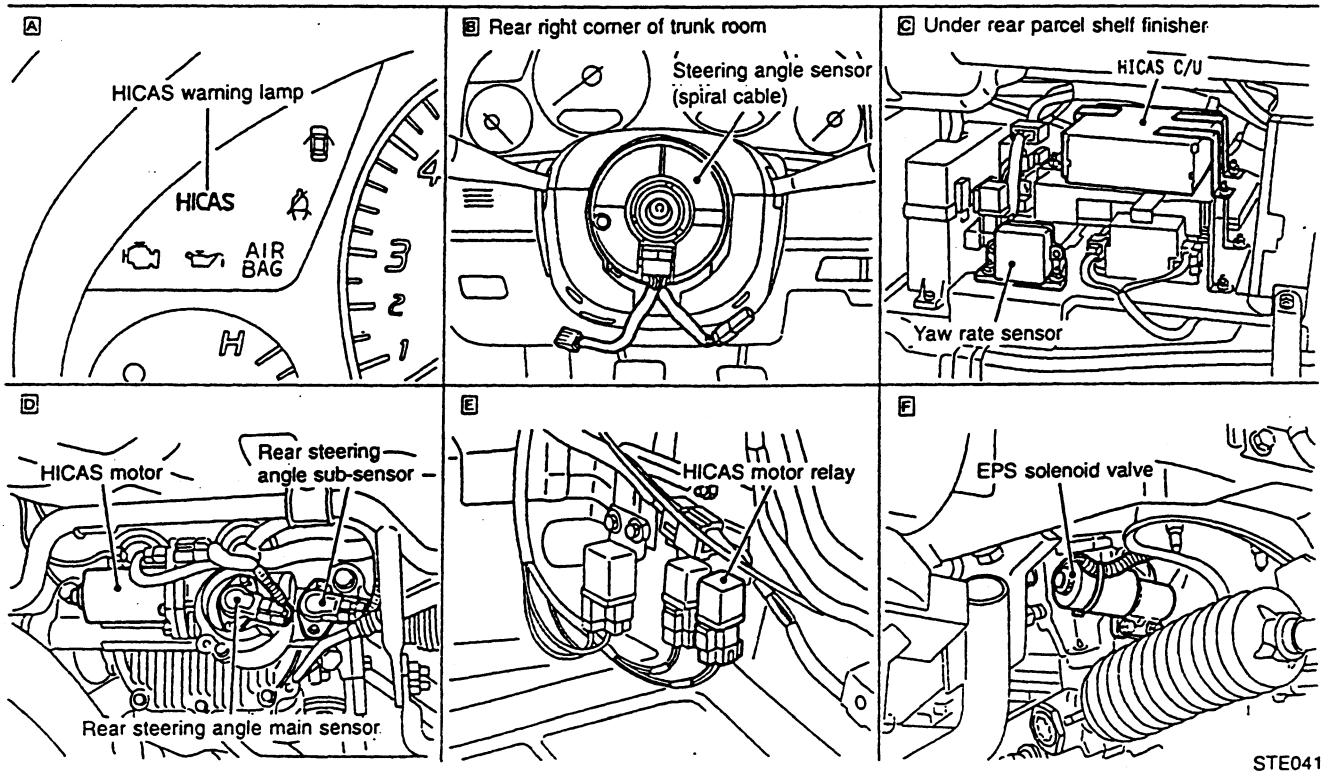
If the system detects some error, it halts the normal control and enters the fail-safe mode.
In this event, the system notifies the driver of a malfunction by turning ON the HICAS warning lamp.
The fail-safe mode is canceled when ignition switch is turned OFF. If, however, the fail-safe mode is caused by a vehicle speed signal error, it is automatically canceled when the signal is restored before the ignition switch is turned OFF.

HICAS WARNING LAMP

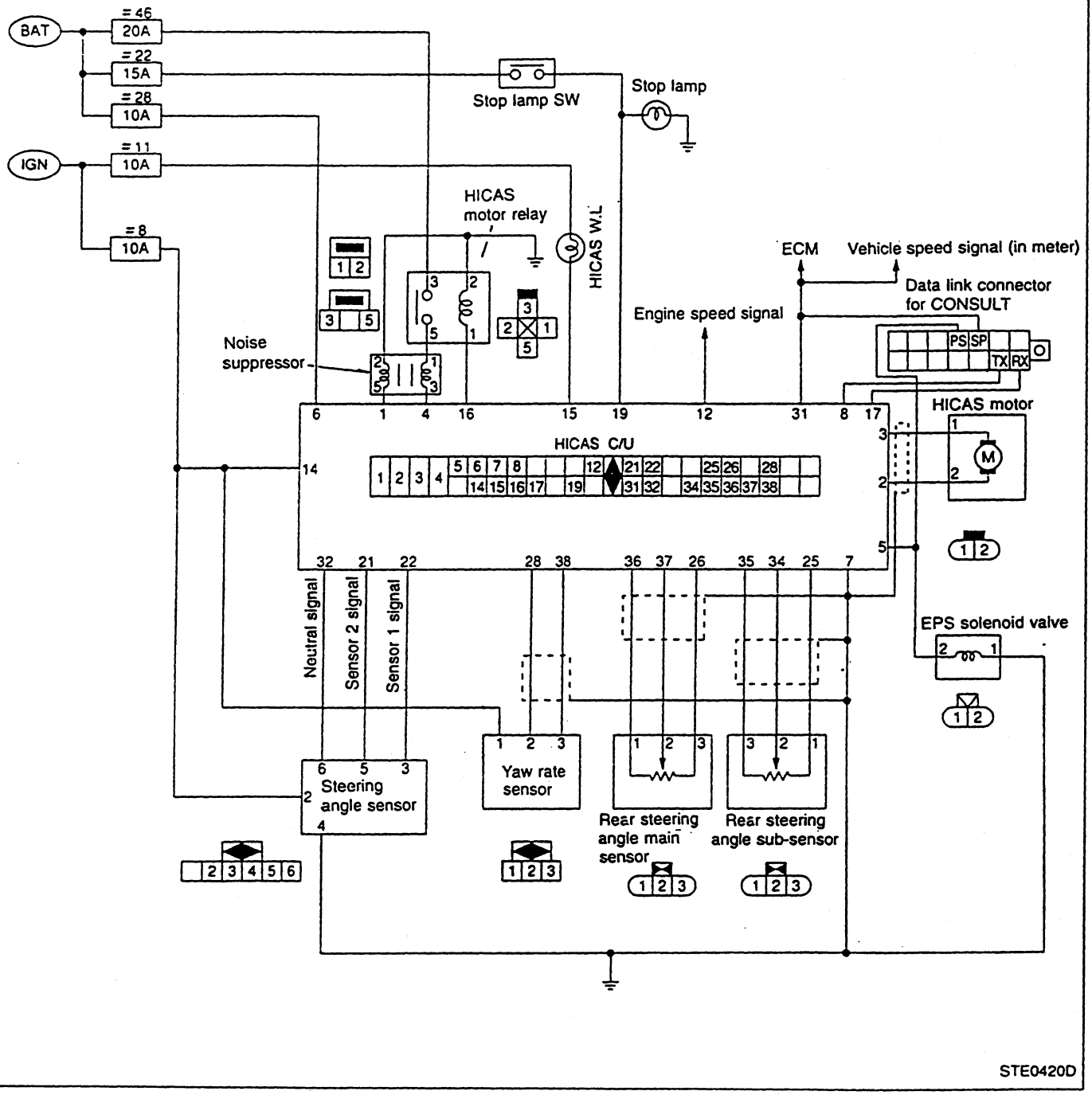
When the system is in normal condition, HICAS warning lamp is turned ON by switching the ignition ON, and is turned OFF after engine has started.

Component Parts Location





Circuit Diagram



Control Unit Input/Output Signal Specifications

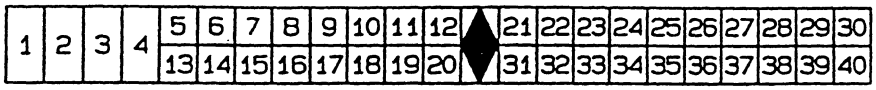
USING CONSULT

The displayed output signals represent the control unit computed data. If the output circuit (harness) should be open, correct values may be displayed.

Monitor item	Data monitor		Check item
	Condition	Specification	
VHCL SPEED SE [km/h]	Vehicle is running or driving wheels are turning.	Approximately equal to speedometer reading	Vehicle speed sensor circuit
STEERING ANG [R/L]	Steering wheel is turned right or left.	Steering angle (degrees) measured from neutral position	Steering angle sensor circuit
NEUTRAL SIG [ON-OFF]	Steering wheel is in neutral position or turned right or left.	When neutral: ON When turned (right or left): OFF	
STOP LAMP SW [ON-OFF]	Brake pedal operation	When pedal is depressed: ON When pedal is not depressed: OFF	Stop lamp switch circuit
ENGINE SPEED [rpm]	Engine is running.	Approximately equal to tachometer reading	Wiring in ECM-HICAS control unit
RR ST ANG·MAI [V]	Actuator is operating in active test (with tires off the ground).	In neutral position: Approx. 2.4V In right lock position: Approx. 4.5V In left lock position: Approx. 0.5V	Rear steering angle sensing system
RR ST ANG·SUB [V]			
YAW RATE SEN [V]	Ignition switch ON or engine operating	When neutral: Approx. 2.5V When turning to the right: Approx. 4.5V When turning to the left: Approx. 0.5V	Yaw rate sensor system
POWER STR SOL [A]	Vehicle speed is changed from 0 to 100 km/h.	At 0 km/h: Approx. 1.1A At 100 km/h: Approx. 0.4A	System related to power steering solenoid output signal
MOTOR CURRENT [A]	Actuator is operating in active test.	OK if output current is detected during operation	Motor and its power supply system
HICAS RELAY [ON-OFF]	Ignition switch is ON or engine is running.	When ignition switch is ON: ON	Power supply system for HICAS motor relay System related to relay driving signal from control unit
FAILSAFE [ON-OFF]		Not in operation	Check malfunctioning parts using self-diagnosis and data monitor.
WARNING LAMP [ON-OFF]		When warning lamp is ON: ON When warning lamp is OFF: OFF	Warning lamp circuit
RR ST ANG·VOL [V]		Approx. 5V	Rear steering angle sensing system
YAW RATE VOLT		Approx. 5V	Yaw rate sensor system
C/U VOLTAGE [V]		Power supply voltage	Control unit power supply circuit
MOTOR VOLTAGE [V]		Power supply voltage	Motor power supply system

Control Unit Input/Output Signal Specifications (Cont'd)

USING CIRCUIT TESTER



STE0401D

Terminal No. +	Terminal No. −	Check item	Specification
1 7	Body ground	Control unit ground circuit	When ignition switch is ON : Approx. 0V
2 3	Body ground	Motor driving output signal	—
4	Body ground	Motor voltage	When ignition switch is ON : Power supply voltage (In fail-safe mode : 0V)
5	Body ground	EPS solenoid driving signal	When vehicle speed is 0 km/h : Approx. 5.0 - 5.5V When vehicle speed is 100 km/h : Approx. 1.0 - 1.5V
6	Body ground	Battery voltage	Power supply voltage
8	—	Data link connector for CONSULT (TX)	—
12	—	Engine speed signal	Measure tachometer driving signal. Refer to EC section ["ECM (TCM) Input/Output Signal Reference Value"].
14	Body ground	Ignition voltage	When ignition switch is ON : Power supply voltage When ignition switch is OFF : 0V
15	Body ground	HICAS warning lamp	When HICAS warning lamp is ON : Approx. 0V When HICAS warning lamp is OFF : Approx. 12V
16	Body ground	Output signal for driving motor relay	When ignition switch is ON : Approx. 12V (In fail-safe mode : 0V)
17	—	Data link connector for CONSULT (RX)	—
19	Body ground	Stop lamp switch signal (Send brake pedal operation signal to control unit.)	When pedal is depressed : Power supply voltage When pedal is not depressed : 0V
21	Body ground	Steering angle sensor 2	When steering wheel is turned, the voltage changes between 0 and 5V.
22	Body ground	Steering angle sensor 1	
25 26	Body ground	Ground circuit for rear steering angle sensor	—
28	Body ground	Ground circuit for yaw rate sensor	—
31	—	Vehicle speed signal	Measure tachometer drive signal. Refer to EC section ["ECM Input/Output Signal Reference Value"].
32	Body ground	Neutral signal of rear steering angle sensor	When neutral : Approx. 5V
34 37	Body ground	Output signal of rear steering angle sensor	When neutral : Approx. 2.4V
35 36	Body ground	Power supply for rear steering angle sensor	When ignition switch is ON : Approx. 5V When ignition switch is OFF : Approx. 0V
38	Body ground	Output signal of yaw rate sensor	When neutral : Approx. 2.5V When turning to the right : Approx. 4.5V When turning to the left : Approx. 0.5V

Preliminary Check

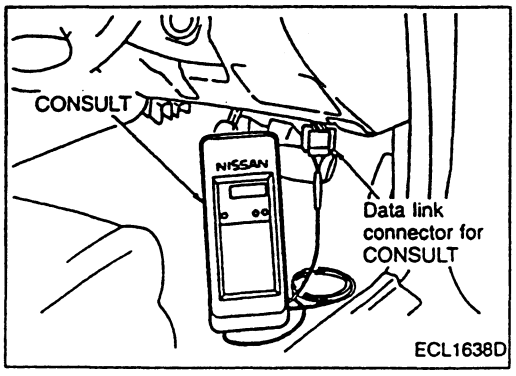
1. Check HICAS actuator for improper attachment and conditions.
- Check the actuator for loose fasteners, damage in actuator body, rods and dust boots, and grease leaks.
2. Check suspension system for improper attachment of links and excessive play in axles.
3. Check all connectors for improper connections.
4. Conduct inspection using self-diagnosis function.

Trouble Diagnosis with CONSULT

DESCRIPTION

The trouble diagnoses have four modes: Self-diagnosis, Data monitor, Active test and ECM Part Number modes.

Mode	Function	Mode switching	Display
SELF-DIAGNOSTIC RESULTS	• Displays results of self-diagnosis.	Mode is switched simply by touching the CONSULT screen.	The CONSULT screen displays the data.
DATA MONITOR	• Used to find main causes of trouble, based on the result of self-diagnosis. • Monitors, records and prints the input and output of HICAS control unit.		
ACTIVE TEST	• Used to find main causes of trouble, based on the result of data monitor. • Used to check the operation of actuator by sending driving signals to it.		
ECM PART NUMBER	• Displays the part number of control unit.		



SELF-DIAGNOSIS PROCEDURE

1. After connecting CONSULT to data link connector, start the engine.

2. Touch "START", "HICAS" and "SELF-DIAG RESULTS".
(1) Record faulty area or item if it appears on CONSULT display.
(2) Touch "ERASE".
3. A self-diagnostic result appears on CONSULT display. When "NO SELF DIAGNOSTIC FAILURE INDICATED" appears, check the items first appearing on display.

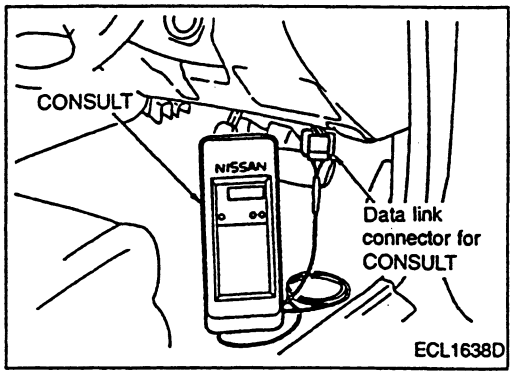
Trouble Diagnosis with CONSULT (Cont'd)

SELF-DIAGNOSTIC RESULTS MODE

Diagnostic item	Diagnostic item is detected when...
VEHICLE SPEED SEN [SIGNAL TURN](·b)	• Vehicle speed signal changes rapidly during running.
STEERING ANGLE SEN [NO ANG SIG](·a)	• Steering angle does not change for a while when vehicle is running at 60 km/h or faster.
STEERING ANGLE SEN [ANG SIG FIX](·e)	• Steering angle from neutral position is kept at 60° degrees or more for a certain time when vehicle is running at 50 km/h or faster.
STEERING ANGLE SEN [ANG FIX30°](·g)	• Steering angle from neutral position is kept at 30° degrees or more while vehicle travels a certain distance.
STEERING ANGLE SEN [NO NEUT SIG](·b)	• No neutral signal (ON signal) is sensed while vehicle travels a certain distance.
STEERING ANGLE SEN [NEU SIG OFF](·c)	• No neutral signal (ON signal) is sensed while steering wheel is turned more than 360°.
STEERING ANGLE SEN [NEUT SIG ON](·d)	• No neutral signal (OFF signal) is sensed while steering wheel is turned more than 50° degrees.
STEERING ANGLE SEN [OFFSET NEUT](·f)	• When steering wheel is turned 360° after the detection of neutral signal, the neutral signal is sensed for a certain period of time.
RR ST ANGLE SENSOR [MAIN SIGNAL](·a)	• For a certain period of time, input signal from main sensor shows abnormality against sensor power supply voltage.
RR ST ANGLE SENSOR [SUB SIGNAL](·b)	• When input signal from main sensor shows 2.5±1V, input signal from sub-sensor shows abnormality against sensor power supply voltage for a certain period of time.
RR ST ANGLE SENSOR [OFFSET SIG](·c)	• Input signals from main sensor and sub-sensor show more than a certain amount of difference from each other.
RR ST ANGLE SENSOR [ABNORMAL VOL](·d)	• The voltage is higher or lower than the standard value.
ENG REV SIGNAL [ABNORMAL SIGNAL]	• Engine speed shows an abnormally low value for a certain period of time when vehicle is running at 2 km/h or faster.
MOTOR VOLTAGE [LOW VOLTAGE](·a)	• When HICAS motor relay is ON, motor power supply voltage shows an abnormally lower value than ignition power supply voltage.
MOTOR VOLTAGE [BAD OBSTRCT](·b)	• When control unit keeps motor power OFF, the motor power voltage shows a non-zero value for a certain period of time.
MOTOR OUTPUT [ABNORML SIG](·a)	• When a motor current is more than 10A, the actual output of the motor shows an abnormally low value for a certain period of time.
MOTOR OUTPUT [REV CURRENT](·c)	• When motor output is kept ON, a reverse current is flowing.
MOTOR OUTPUT [NO CURRENT](·d)	• When motor output is kept OFF, a current is flowing.
MOTOR OUTPUT [OVERCURRENT](·e)	• When motor output is kept ON, an overcurrent is flowing.
MOTOR OUTPUT [MOTOR LOCK](·b)	• Signal from rear steering angle sensor does not change for a certain period of time while a motor current of 17A or more is flowing.
VEHICLE SPEED SEN [RAPD SIGN CHANGE2]	• When vehicle is running, vehicle speed signal is not sensed for a certain period of time after it has changed rapidly.

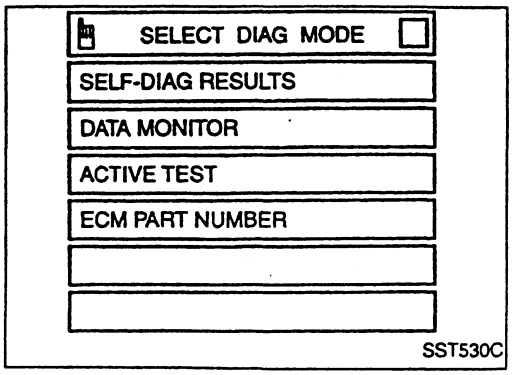
Trouble Diagnosis with CONSULT (Cont'd)

Diagnostic item	Diagnostic item is detected when...
VEHICLE SPEED SEN [NO SIGNAL2]	• "VEHICLE SPEED SEN [RPD SIG CHG2]" has occurred previously, and vehicle speed signal is not sensed for a certain period of time.
VEHICLE SPEED SEN [NO SIGNAL3]	• "VEHICLE SPEED SEN [RPD SIG CHG2]" has not occurred previously, and vehicle speed signal is not sensed for a certain period of time while the vehicle is running at 1,500 rpm of engine speed.
CONTROL UNIT [ABNORMAL 1-6]	• Control unit is malfunctioning.
YAW RATE SENSOR [ABNORMAL SIGNAL]	• Yaw rate sensor input signal becomes abnormal for a certain period of time.

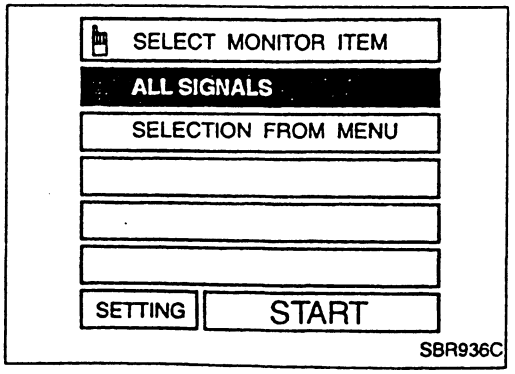


DATA MONITOR PROCEDURE

1. After connecting CONSULT to data link connector, start the engine.



2. Touch "START", "HICAS" and "DATA MONITOR".



3. Select items to be monitored.
(1) When "ALL SIGNALS" is selected, touch "START".
(2) When "SELECTION FROM MENU" is touched, "SELECT TEST ITEM" screen appears. Touch appropriate items on that screen, and touch "ENTER" and "START".
(3) Touch "PRINT", if printout is required.

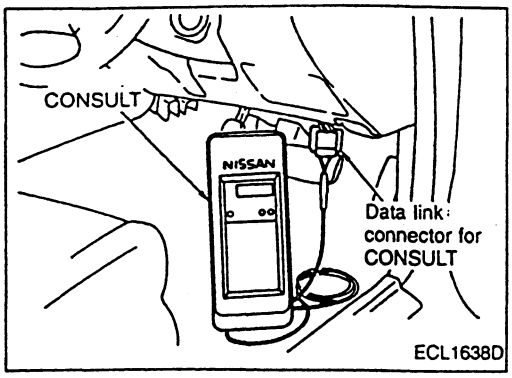
Trouble Diagnosis with CONSULT (Cont'd)

DATA MONITOR MODE

Display		Monitor item		Remarks
		Main item	Menu item	
VHCL SPEED SE	(km/h)	○	○	Shows a value calculated from vehicle speed sensor signal.
STEERING ANG	(R/L°)	○	○	After battery has been disconnected and connected again, an abnormal value is shown until neutral position (0°) is detected.
NEUTRAL SIG	(ON-OFF)	○	○	Shows whether steering wheel is in neutral position (ON/OFF).
STOP LAMP SW	(ON-OFF)	○	○	Shows whether stop lamp switch is ON or OFF.
ENGINE SPEED	(rpm)	○	○	Shows the engine speed calculated from crankshaft position sensor signal.
RR ST ANG·MAI	(V)	○	○	Shows the output voltage from rear steering angle main sensor.
RR ST ANG·SUB	(V)	○	○	Shows the output voltage from rear steering angle sub-sensor.
YAW RATE SEN	(V)	○	○	Shows output voltage sent from yaw rate sensor.
POWER STR SOL	(A)	○	○	Shows the control unit's control current for power steering solenoid.
MOTOR CURRENT	(A)	○	○	Shows the control unit's control current for HICAS motor relay.
HICAS RELAY	(ON-OFF)	○	○	Shows whether HICAS motor relay is ON or OFF.
FAILSAFE	(ON-OFF)	○	○	Shows whether fail-safe function is in operation (ON/OFF).
WARNING LAMP	(ON-OFF)	○	○	Shows the control unit's ON-OFF status of HICAS warning lamp.
RR ST AGN·VOL	(V)	○	○	Shows the power supply voltage from HICAS control unit to rear steering angle sensor.
YAW RATE VOL	(V)	○	○	Shows control voltage of yaw rate sensor built into control unit
C/U VOLTAGE	(V)	○	○	Shows the power supply voltage to HICAS control unit.
MOTOR VOLTAGE	(V)	○	○	Shows the power supply voltage from HICAS control unit to HICAS motor.
VOLTAGE	(V)	—	○	Shows the measured value by voltage probe.
PULSE	(ms, Hz and %)	—	○	Shows the measured value by pulse probe. If measurement is impossible, "#" appears. The "#" mark is shown also on the left of final data until measurement is completed.

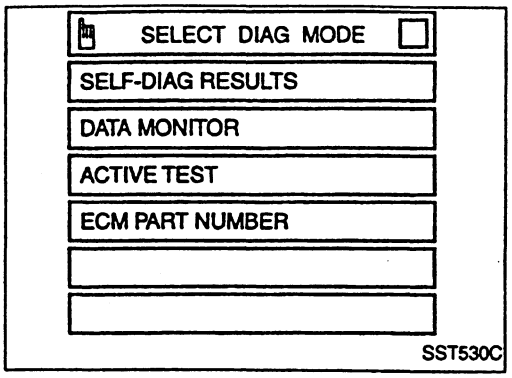
Trouble Diagnosis with CONSULT (Cont'd)

ACTIVE TEST PROCEDURE

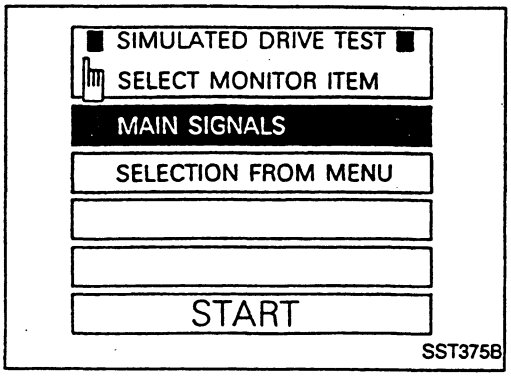


Perform active tests with tires off the ground.

1. After connecting CONSULT to data link connector, start the engine.



2. Touch "START", "HICAS" and "ACTIVE TEST".



3. Touch "SIMULATE" and "SELECT MONITOR ITEM".
4. Turn the steering wheel right or left to make the rear actuator operate.

Reference values in normal condition

Steering angle sensor	Rear steering angle main sensor	Rear steering angle sub-sensor	Motor current
0° (Neutral)	2.4V	2.4V	No (Approx. 0V)
R 90°	4.4V	4.4V	Yes (Variable)
L 90°	0.4V	0.4V	

ECM PART NUMBER

1. After connecting CONSULT to data link connector, turn ignition switch ON or start the engine.
2. Touch "START", "HICAS" and "ECM PART NUMBER".

- Part number printed on the control unit label and part number shown on the CONSULT screen is 28505 AA300.

Trouble Diagnosis with Self-diagnosis

DESCRIPTION

If the system detects some error while vehicle is running, it notifies the driver of a malfunction by turning ON the HICAS warning lamp, and at the same time, it halts the normal control and enters the fail-safe mode.

SELF-DIAGNOSIS PROCEDURE

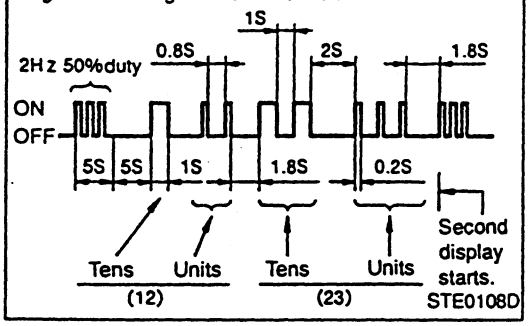
1. Start the engine.
2. Within 10 seconds after the engine has started, turn the steering wheel more than 20° right-to-left and repeat this 5 times or more, and then depress the brake pedal 5 times or more.

Trouble Diagnosis with Self-diagnosis (Cont'd)

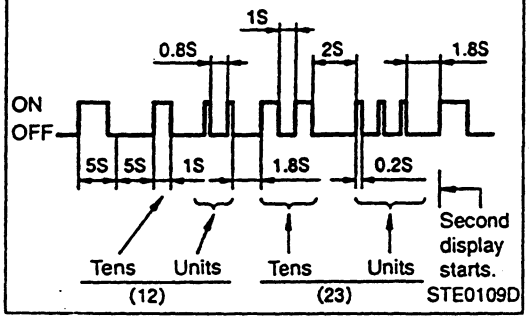
DIAGNOSTIC ITEM INPUT

1. Move the vehicle one or two meters at a very low speed.
2. Turn the steering wheel more than 20° right-to-left once or more.

Example: Motor power supply and steering angle neutral signal are abnormal.



Example: Motor power supply and steering angle neutral signal are abnormal.



DISPLAY OF SELF-DIAGNOSTIC RESULTS

The results of self-diagnosis are shown by flash patterns of HICAS warning lamp.

Display when past data shows that fail-safe function has been activated previously

- Only an abnormal item is indicated by the pattern shown in the left figure. The pattern is repeated.

Display when past data shows that fail-safe function has not been activated previously

- If all items are normal, HICAS warning lamp flashes at a frequency of 4 Hz.
- If system is in fail-safe mode, only an abnormal item is indicated by the pattern shown in the left figure. The pattern is repeated.

MALFUNCTION CODE CHART

Malfunction code No.	Diagnostic item
11	Control unit
12	Motor power supply
13	Motor output
21	Vehicle speed signal
22	Steering angle signal
23	Steering angle neutral signal
24	Rear steering angle main sensor signal
25	Rear steering angle sub-sensor signal
33	Engine speed signal
41	Yaw rate signal

HOW TO ERASE SELF-DIAGNOSTIC RESULTS

If past record shows that fail-safe function has been activated previously, use CONSULT, or leave the battery disconnected for more than 30 minutes to clear the memory.

Symptom Chart

Diagnostic item			Inspection 1	Inspection 2	Inspection 3	Inspection 4	Inspection 5	Inspection 6	Inspection 7	Inspection 8	Self-diagnosis	Control unit circuit check	Stop lamp switch circuit check	Steering angle sensor circuit check	Warning lamp circuit check	Meter circuit check	Engine speed signal circuit check	Vehicle speed signal check (Inspection 4).	Actuator assembly check	
Self-diagnosis	Self-diagnosis: Malfunction code No.	Self-diagnosis: Diagnostic item	CONSULT: Diagnostic item																	
	11	Control unit	CONTROL UNIT [ABNORMAL 1-6]	○																
	12	Motor power supply	MOTOR VOLTAGE [LOW VOLTAGE](·a)		○															
			MOTOR VOLTAGE [BAD OBSTRCT](·b)		○															
	13	Motor output	MOTOR OUTPUT [ABNORML SIG](·a)			○														
			MOTOR OUTPUT [MOTOR LOCK](·b)			○														
			MOTOR OUTPUT [REV CURRENT](·c)			○														
			MOTOR OUTPUT [NO CURRENT](·d)			○														
			MOTOR OUTPUT [OVERCURRENT](·e)			○														
	21	Vehicle speed signal	VEHICLE SPEED SEN [NO SIGNAL2]				○													
			VEHICLE SPEED SEN [NO SIGNAL3]				○													
			VEHICLE SPEED SEN [SIGNAL TURN](·b)				○													
			VEHICLE SPEED SEN [RPD SIG CHG2]				○													
	22	Steering angle signal	STEERING ANGLE SEN [NO ANG SIG](·a)					○												
			STEERING ANGLE SEN [ANG SIG FIX](·b)					○												
			STEERING ANGLE SEN [ANG FIX30°](·g)					○												
	23	Steering angle neutral signal	STEERING ANGLE SEN [NO NEUT SIG](·b)					○												
			STEERING ANGLE SEN [NEUT SIG OFF](·c)					○												
			STEERING ANGLE SEN [NEUT SIG ON](·d)					○												
			STEERING ANGLE SEN [OFFSET NEUT](·f)					○												
	24	Rear steering angle main sensor signal	RR ST ANGLE SENSOR [MAIN SIGNAL](·a)						○											
			RR ST ANGLE SENSOR [ABNORML VOL](·d)						○											
			RR ST ANGLE SENSOR [OFFSET SIG](·c)						○											
	25	Rear steering angle sub-sensor signal	RR ST ANGLE SENSOR [SUB SIGNAL](·b)						○											
			RR ST ANGLE SENSOR [ABNORML VOL](·d)						○											
			RR ST ANGLE SENSOR [OFFSET SIG](·c)						○											
	33	Engine speed signal	ENG REV SIGNAL [ABNORMAL SIGNAL]							○										
	41	Yaw rate signal	YAW RATE SENSOR [ABNORMAL SIGNAL]								○									

Symptom Chart (Cont'd)

Trouble diagnoses based on phenomena	Diagnostic item: Self-diagnosis: Malfunction code No.	Diagnostic item: Self-diagnosis: Diagnostic item	Diagnostic item: CONSULT: Diagnostic item	Inspection 1	Inspection 2	Inspection 3	Inspection 4	Inspection 5	Inspection 6	Inspection 7	Inspection 8	Self-diagnosis	Control unit circuit check	Stop lamp switch circuit check	Steering angle sensor circuit check	Warning lamp circuit check	Meter circuit check	Engine speed signal circuit check	Vehicle speed signal check (Inspection 4)	Actuator assembly check
Cannot enter self-diagnosis mode.													○	○	○					
HICAS warning lamp is not turned ON by switching the ignition ON.													○							
HICAS warning lamp is turned ON by switching the ignition ON but is not turned OFF by starting the engine.												○	○	○	○		○	○		
Illumination of HICAS warning lamp has occurred after engine started.												○								
Steering effort does not change with vehicle speed.												○		○					○	
There is an abnormal noise.												○							○	○
Self-diagnosis with CONSULT displays "CONSULT".																			○	

RESTRAINT SYSTEM

SECTION RS

MODIFICATION NOTICE:
For seat belt pre-tensioner, self-diagnostic items displayed on the CONSULT screen have been changed.

CONTENTS

TROUBLE DIAGNOSIS - SUPPLEMENTAL RESTRAINT SYSTEM (SRS) 2

Trouble Diagnosis with CONSULT 2

Trouble Diagnosis with CONSULT

SELF-DIAGNOSIS

- **Self-diagnostic procedures for the supplemental restraint system remain unchanged from the previous vehicle model.**

Self-diagnostic code chart

Diagnostic item	Explanation	Repair order
PRE-TEN FRONT RH [OPEN/VB-SHORT]	• Driver seat belt pre-tensioner circuit is open or shorted to some power supply circuit.	1. Visually check the wiring harness connection. 2. Replace the driver seat belt pre-tensioner. 3. Replace the diagnosis sensor unit. 4. Replace the harness if it has visible damage.
PRE-TEN FRONT RH [GND-SHORT]	• Driver seat belt pre-tensioner circuit is shorted to ground.	
PRE-TEN FRONT LH [OPEN/VB-SHORT]	• Passenger seat belt pre-tensioner circuit is open or shorted to some power supply circuit.	1. Visually check the wiring harness connection. 2. Replace the passenger seat belt pre-tensioner. 3. Replace the diagnosis sensor unit. 4. Replace the harness if it has visible damage.
PRE-TEN FRONT LH [GND-SHORT]	• Passenger seat belt pre-tensioner circuit is shorted to ground.	

For seat belt pre-tensioner systems, only "SELF-DIAG [CURRENT]" is displayed; "SELF-DIAG [PAST]" and "TROUBLE DIAG RECORD" are not displayed.

HEATER & AIR CONDITIONER

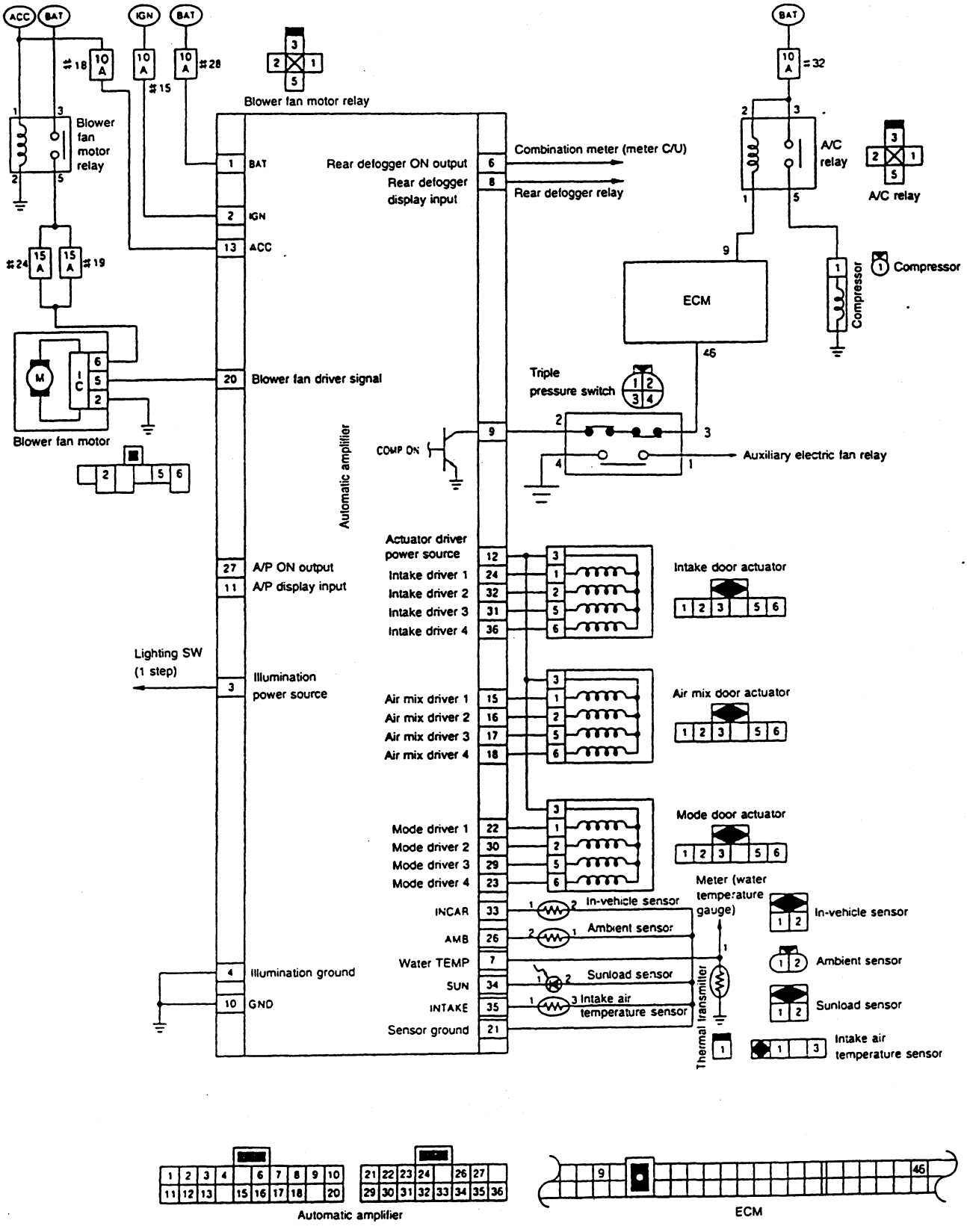
SECTION HA

MODIFICATION NOTICE:
Self-diagnosis display has been changed.

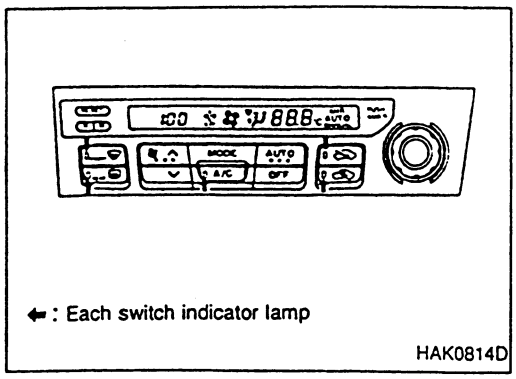
CONTENTS

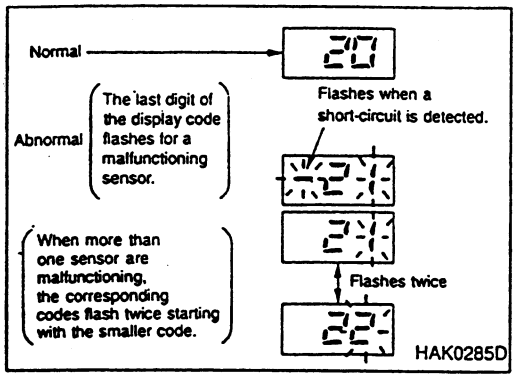
FULLY AUTOMATIC AIR CONDITIONER 2
Circuit Diagram 2
Trouble Diagnosis by Self-diagnosis Function 3
Magnet Clutch System Check 6

Circuit Diagram



HA-0991D





Trouble Diagnosis by Self-diagnosis Function

SELF-DIAGNOSIS DISPLAY ITEM

Step 1 — Display segments and indicator lamp check

Check the controller switch indicator lamp and display segments.
Normal: The switch indicator lamp and display segments are illuminated.
Abnormal: Malfunctioning area will not be illuminated.

A/C switch indicator lamp does not illuminate if automatic heater is equipped.

Step 2 — Each sensor check

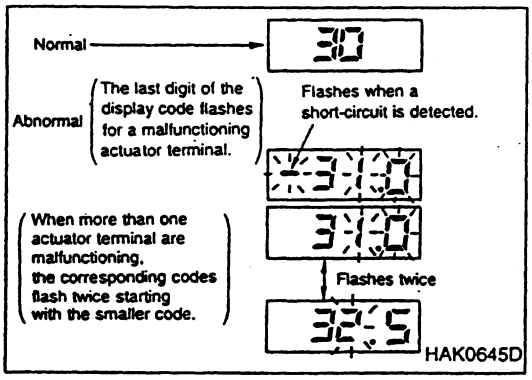
Display shows "2" for approx. 1 second in the step 2 mode, and then shows the judgement result.
Check the data of each sensor inputted into the automatic amplifier.
Normal: Display shows "20".
Abnormal: The last digit of the display code flashes for a malfunctioning sensor. At this time, if a short-circuit is detected, "–" is displayed. Furthermore, when there are more than one malfunctioning sensor, the corresponding display codes flash twice starting with the smaller code.

The sunload sensor will judge an abnormality when there is insufficient lighting (less than 5,000 lx) such as while being placed indoor or during the evening.

Trouble Diagnosis by Self-diagnosis Function (Cont'd)

Display code for malfunctioning sensor and identifying condition for automatic amplifier

Display code	Sensor	Identifying condition for automatic amplifier	
		Open circuit	Short-circuit
21	Ambient sensor	Less than –41.9°C	More than 100°C
22	In-vehicle sensor	Less than –41.9°C	More than 100°C
24	Intake air temperature sensor	Less than –41.9°C	More than 100°C
25	Sunload sensor	Less than 41.8 W/m² (36.0 kcal/m²·h)	More than 1,729 W/m² (1,487 kcal/m²·h)



Step 3 — Each actuator check and reset

Display shows "3" for approx. 1 second in the step 3 mode, and then shows the judgement result.
Transmit an output signal to the intake door actuator, mode door actuator, and air mix door actuator; and check each actuator. Furthermore, the actuator can be reset by pressing the front DEF switch at this time.
Normal: Display shows "30".
Abnormal: The display code flashes for a malfunctioning actuator. At this time, if a short-circuit is detected, "–" is displayed. Furthermore, when there are more than one malfunctioning sensor, the corresponding display codes flash twice starting with the smaller code.
During reset: Display flashes "30" and front DEF switch. (Approx. 10 seconds)

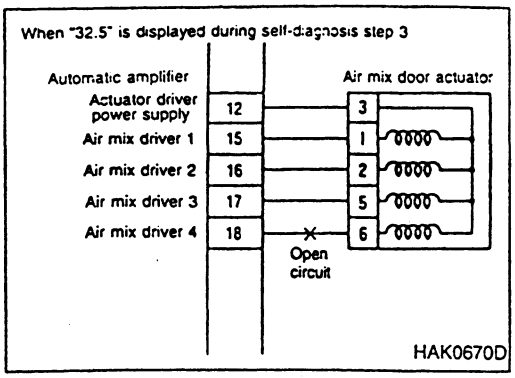
Actuator display code

Display code	31.0 - 32.5	33.0 - 34.5	35.0 - 36.5
Actuator	Air mix door	Mode door	Intake door

Faulty harness display

Actuator	Air mix door actuator				Mode door actuator				Intake door actuator			
Terminal No. (actuator side)	1	2	5	6	1	2	5	6	1	2	5	6
Terminal No. (automatic amplifier side)	15	16	17	18	22	30	29	23	24	32	31	36
Short-circuit failure display	–31.0	–31.5	–32.0	–32.5	–33.0	–33.5	–34.0	–34.5	–35.0	–35.5	–36.0	–36.5
Open circuit failure display	31.0	31.5	32.0	32.5	33.0	33.5	34.0	34.5	35.0	35.5	36.0	36.5

Trouble Diagnosis by Self-diagnosis Function (Cont'd)



- When a open-circuit failure is displayed for all four terminals of each actuator, there is a possibility of a disconnected connector, or broken harness of the actuator driver power source.
- The self-diagnosis cannot detect short-circuit between actuator driver signals, but the actuators will vibrate when actuated.

Step 4 — Each output device check

Display shows "41" in the step 4 mode. When the DEF switch is pushed it switches from 42→43→44→45→46→41. As indicated in the following table, the automatic amplifier forcefully outputs to each actuator, blower fan motor, and compressor in response to the display code. Confirm and check each output operation status by observing, listening to the operating sound, placing hand at the air outlet, or using other methods.

The operation status of each actuator, blower fan motor, and compressor cannot be confirmed on the display.

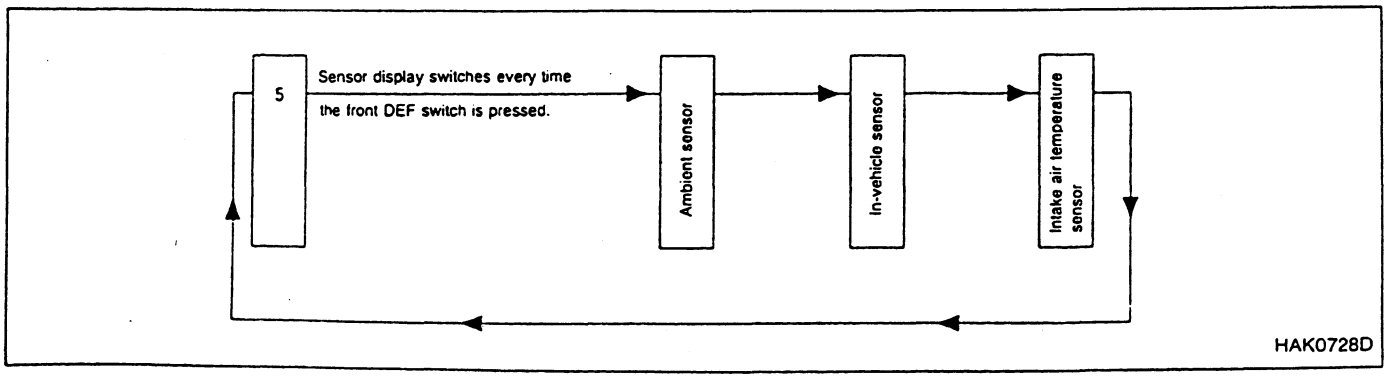
Display code for output device and status

Output device \ Display code	41	42	43	44	45	46
Mode door	VENT	B/L	B/L	FOOT	D/F	DEF
Intake door	Recirculation	Recirculation	20% ambient	Ambient	Ambient	Ambient
Air mix door	Full cold	Full cold	Open 50%	Open 50%	Full hot	Full hot
Blower fan motor	35%	75%	61%	61%	61%	100%
Compressor (Fully automatic air conditioner only)	ON	ON	ON	OFF	OFF	ON
Air purifier (only when connected)	ON	ON	ON	OFF	OFF	ON

The blower fan motor revolution is controlled by the duty ratio signal outputted from the automatic amplifier. [For duty ratio, refer to "Blower Fan Motor System Check" in the Service Manual (Pub. No. SM9E-R34AJ0).]

Step 5 — Detected temperature display for each sensor

Display shows "5" in the step 5 mode. Every time the DEF switch is pushed, the detected sensor temperature is displayed in 0.5°C increments.



Trouble Diagnosis by Self-diagnosis Function (Cont'd)

Set- and control-temperature difference setting

The set temperature controlled by the automatic amplifier appears on the display. It can be adjusted as required by passengers preference when it differs from vent temperatures. When the controller's fan switch is pressed in the self-diagnostic function Step 5, the difference between the set temperature and control temperature appears on the display. Each time the temperature control dial is turned, the temperature shown on the display can be changed as required at intervals of 0.5°C in the ±3.0°C range up to −3.0°C.

CAUTION:

If the battery is removed or the battery voltage drops below 9V, the set- and control-temperature difference setting will be cancelled.

Magnet Clutch System Check

MAGNET CLUTCH

Disconnect the compressor connector. Apply approx. 12V to the compressor to check the magnet clutch operation.

AIR CONDITIONER RELAY

- Remove the air conditioner relay. Apply approx. 12V between the air conditioner relay terminals No. 1 and 2. Check the relay operation sound.
- Check the continuity between terminals No. 3 and 5.

REFRIGERANT CHARGE AMOUNT

- Connect the manifold gauge to the vehicle side service valve.
- Check that the lower pressure side (gauge pressure) is more than approx. 0.18 MPa (1.8 kg/cm^2·G).

ECM

Start the engine, and short-circuit the ECM terminal No. 9 to the ground. Check the magnet clutch operation.

INTAKE AIR TEMPERATURE SENSOR

Start the engine, and short-circuit the intake air temperature sensor terminal No. 1 to the ground. Check the magnet clutch operation.

PRESSURE SWITCH

Remove pressure switch connector. Check continuity between switch terminals.

ELECTRICAL SYSTEM

SECTION EL

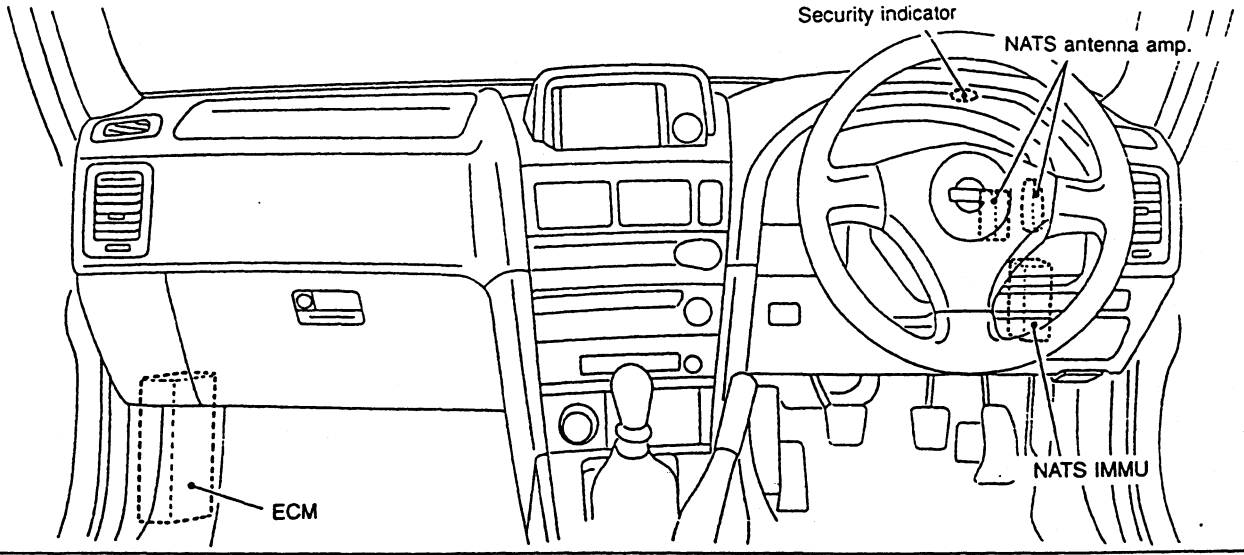
MODIFICATION NOTICE:

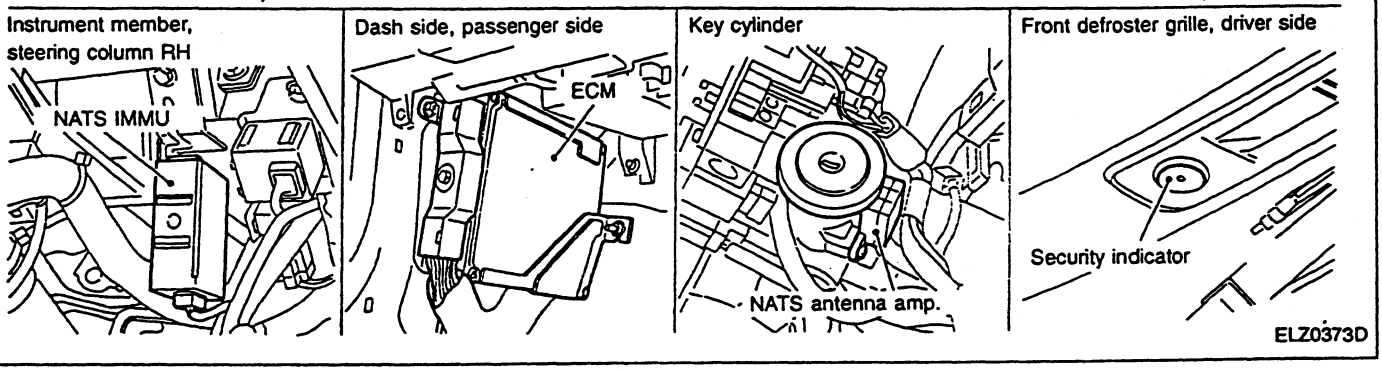
- NATS (Nissan Anti-Theft System) has been added.
- Multi-function display has been added.

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Component Parts





System Description

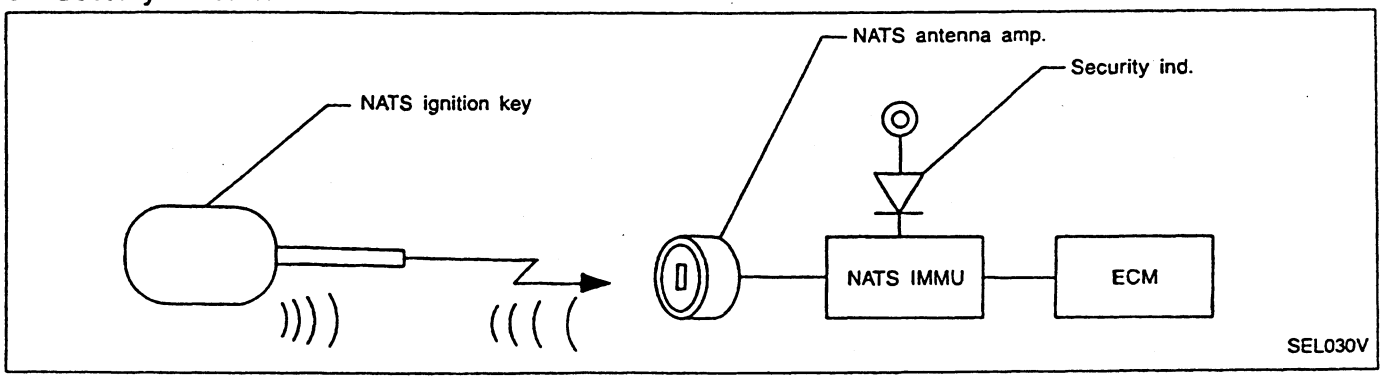
NATS (Nissan Anti-Theft System) has the following immobiliser functions:

- Since only NATS ignition keys, whose ID nos. have been registered into the ECM and IMMU of NATS, allow the engine to run, operation of a stolen vehicle without a NATS registered key is prevented by NATS. That is to say, NATS will immobilise the engine if someone tries to start it without the registered key of NATS.
- All of the originally supplied ignition key IDs (except for card plate key) have been NATS registered. If requested by the vehicle owner, a maximum of five key IDs can be registered into the NATS components.
- The security indicator blinks when the ignition switch is in "OFF" or "ACC" position. Therefore, NATS warns outsiders that the vehicle is equipped with the anti-theft system.
- When NATS detects trouble, the security indicator lamp lights up while ignition key is in the "ON" position.
- NATS trouble diagnoses, system initialization and additional registration of other NATS ignition key IDs must be carried out using CONSULT hardware and CONSULT NATS software.
 When NATS initialization has been completed, the ID of the inserted ignition key is automatically NATS registered. Then, if necessary, additional registration of other NATS ignition key IDs can be carried out.
 Regarding the procedures of NATS initialization and NATS ignition key ID registration, refer to CONSULT operation manual, NATS.
- A maximum of 5 keys (including the standard key) per vehicle can be registered for ID (identification) as requested by car owner.
- Use of other than genuine Nissan ECM in vehicles makes it impossible to start engines.
- **When servicing a malfunction of the NATS (indicated by lighting up of Security Indicator Lamp) or registering another NATS ignition key ID no., it may be necessary to re-register original key identification. Therefore, be sure to receive all keys from vehicle owner.**

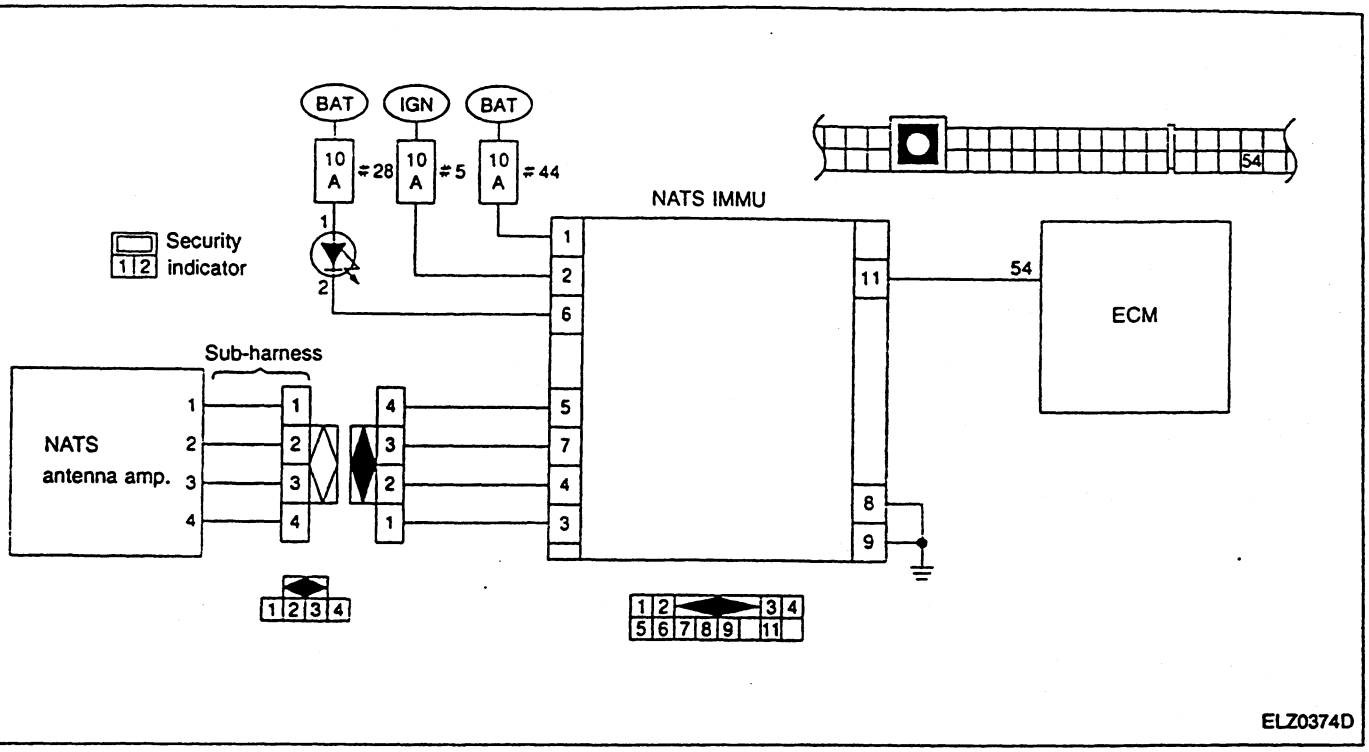
System Composition

The immobiliser function of the NATS consists of the following:

- NATS ignition key
- NATS antenna amp. located in the ignition key cylinder
- NATS immobiliser control unit (NATS IMMU)
- Engine control module (ECM)
- Security indicator

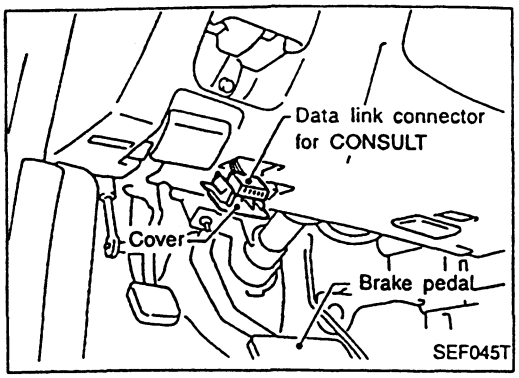


Circuit Diagram



Immobilizer Control Unit Input/Output Signal Specifications

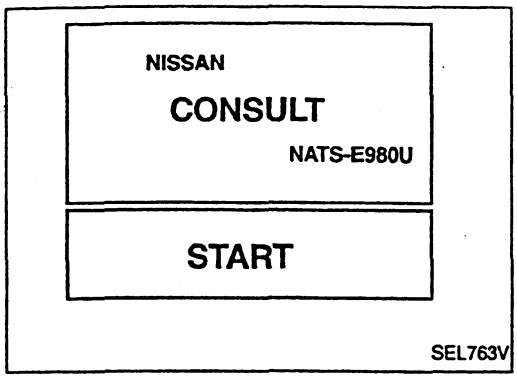
Terminal No.	Measuring condition		Specification
	Ignition switch	Operation or condition	
1	OFF	—	Approx. 12V
2	ON	—	Approx. 12V
3	OFF	—	Approx. 0V
	ON	—	Approx. 5V
4	OFF	—	Approx. 0V
	ON	—	As soon as ignition switch is turned ON, analog tester pointer deflects.
5	OFF	—	Approx. 4.4V
	ON	(Activated with ID-registered key)	As soon as ignition switch is turned ON, analog tester pointer deflects.
6	ON	—	Approx. 10V
	OFF	—	Analog tester pointer deflects at an interval of approx. 2.4 second cycles.
7	ON	—	Approx. 0V
8	ON	—	Approx. 0V
9	ON	—	Approx. 0V
11	OFF	—	Approx. 12V
	—	Ignition switch is turned from OFF to ON. (Activated with ID-registered key)	As soon as ignition switch is turned ON, analog tester pointer deflects.
	—	Ignition switch is turned from ON to OFF. (Activated with ID-registered key)	As soon as ignition switch is turned OFF, analog tester pointer deflects.



CONSULT

CONSULT INSPECTION PROCEDURE

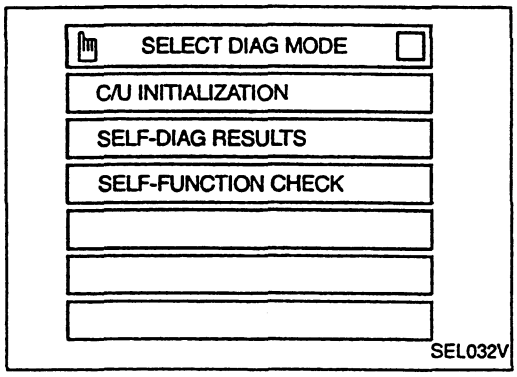
1. Turn ignition switch OFF.
2. Connect "CONSULT" to Data link connector for CONSULT.



3. Insert NATS program card into CONSULT.

⬅: Program card
NATS-E980U

4. Turn ignition switch ON.
5. Touch "START".



6. Perform each diagnostic test mode according to each service procedure.

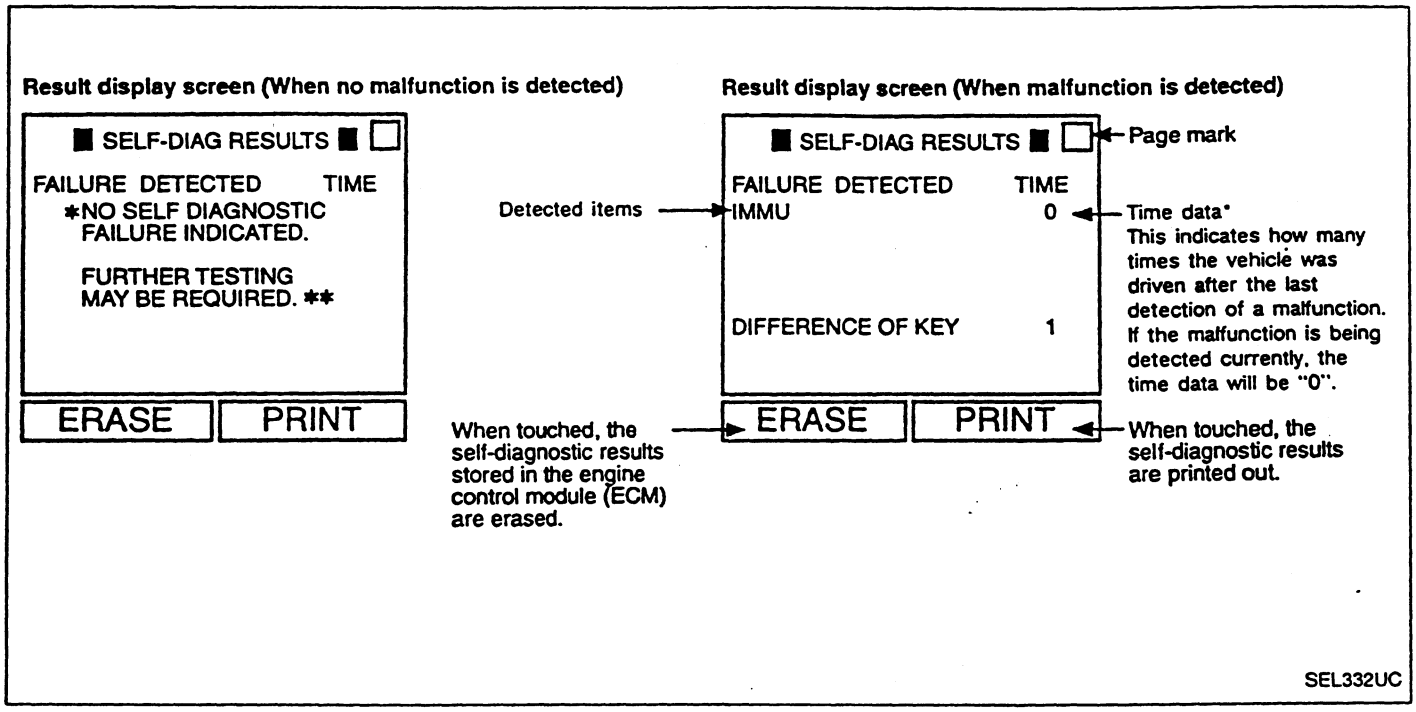
For further information, see the CONSULT Operation Manual, NATS.

CONSULT (Cont'd)

CONSULT DIAGNOSTIC TEST MODE FUNCTION

CONSULT DIAGNOSTIC TEST MODE	Description
C/U INITIALIZATION	When replacing any of the following three components, C/U initialization is necessary. [NATS ignition key/IMMU/ECM]
SELF-FUNCTION CHECK	ECM checks its own NATS communication interface by itself.
SELF-DIAGNOSTIC RESULTS	Detected items (screen terms) are as shown in the chart below.

HOW TO READ SELF-DIAGNOSTIC RESULTS



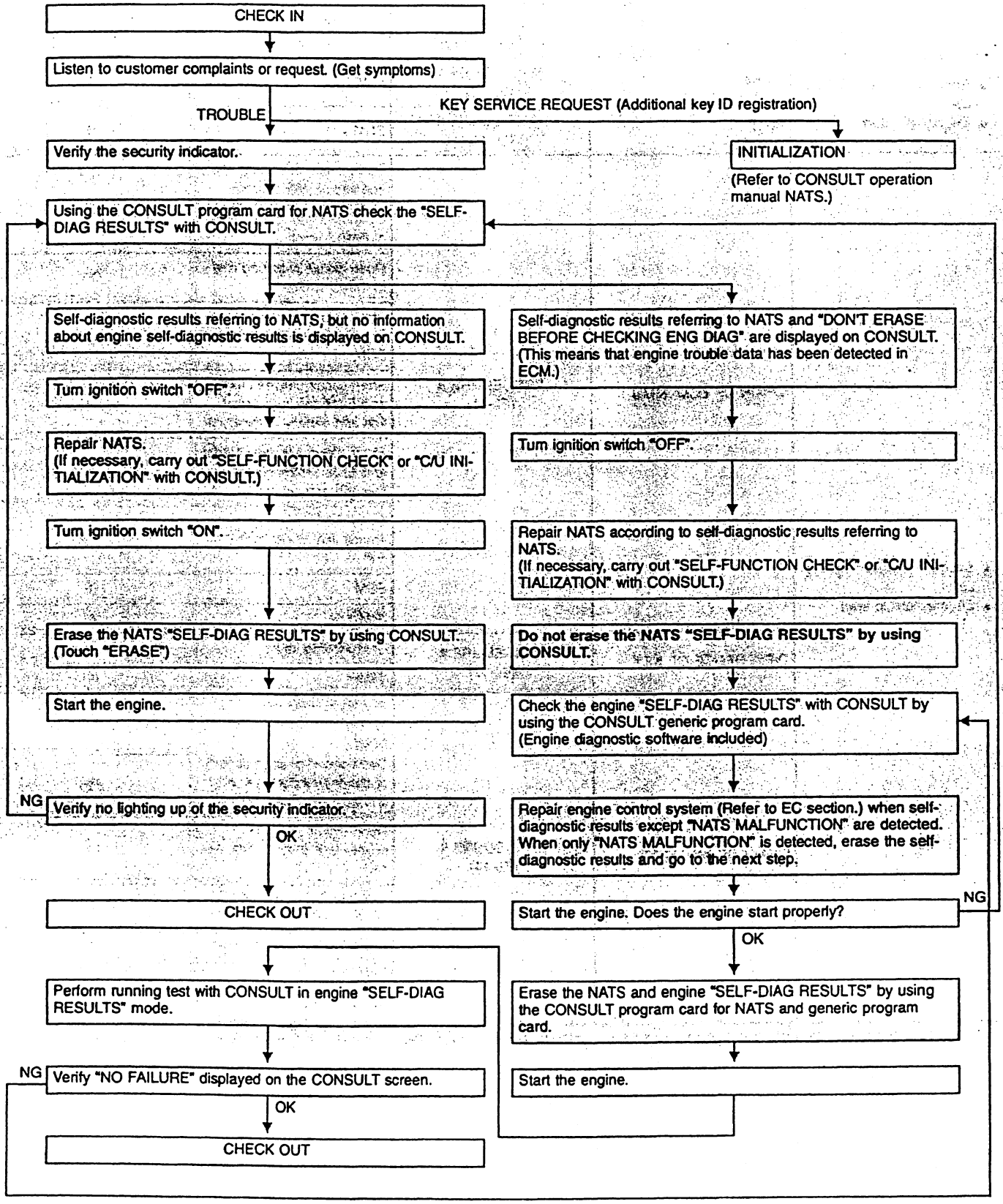
* If trip number is more than 1, MIL does not blink.

SELF-DIAGNOSTIC RESULTS ITEM CHART

Detected items (Screen terms)	Description	Reference page
IMMU	ECM received the signal from IMMU that IMMU is malfunctioning.	EL-10
ECM	ECM is malfunctioning.	EL-10
CHAIN OF ECM-IMMU	Communication impossible between ECM and IMMU.	EL-11
DIFFERENCE OF KEY	IMMU can receive the key ID signal but the result of ID verification between key ID and IMMU is NG.	EL-13
CHAIN OF IMMU-KEY	IMMU cannot receive the key ID signal.	EL-14
ID DISCORD, IMM-ECM	The result of ID verification between IMMU and ECM is NG. System initialization is required.	EL-15
ELECTRONIC NOISE	Noise (interference) interfered into NATS communication lines during communicating.	EL-16
DON'T ERASE BEFORE CHECKING ENG DIAG	Engine trouble data and NATS trouble data have been detected in ECM.	EL-7
LOCK MODE	When an unregistered ignition key is used, or if the starting operation is carried out 5 or more times consecutively with the ignition key, IMMU or ECM malfunctioning, NATS will shift the mode to one which prevents the engine from being started.	EL-18

Trouble Diagnoses

WORK FLOW



Trouble Diagnoses (Cont'd)

SYMPTOM MATRIX CHART
(Self-diagnosis related item)

SYMPTOM	Displayed "SELF-DIAG RESULTS" on CONSULT screen.	DIAGNOSTIC PROCEDURE (Reference page)	SYSTEM (Malfunctioning part or mode)	REFERENCE PART NO. OF ILLUSTRATION ON NEXT PAGE
• Security indicator lighting up* • Engine will start.	IMMU	PROCEDURE 1 (EL-10)	IMMU	A
	ECM	PROCEDURE 2 (EL-10)	ECM	B
• Security indicator lighting up* • Engine hard to start	CHAIN OF ECM-IMMU	PROCEDURE 3 (EL-11)	Open circuit in battery voltage line of IMMU circuit	C1
			Open circuit in ignition line of IMMU circuit	C2
			Open circuit in ground line of IMMU circuit	C3
			Open circuit in communication line between IMMU and ECM	C4
			Short circuit between IMMU and ECM communication line and battery voltage line	C4
			Short circuit between IMMU and ECM communication line and ground line	C4
			Open circuit in power source line of ANT/AMP circuit	E3
			ECM	B
			IMMU	A
	DIFFERENCE OF KEY	PROCEDURE 4 (EL-13)	Unregistered key	D
			IMMU	A
	CHAIN OF IMMU-KEY	PROCEDURE 5 (EL-14)	Communication line between ANT/AMP and IMMU: Open circuit or short circuit of battery voltage line or short circuit of ground line	E1
				E2
			Open circuit in power source line of ANT/AMP circuit	E3
			Open circuit in ground line of ANT/AMP circuit	E4
			Malfunction of key ID chip	E5
			IMMU	A
			Antenna amp.	E6

*: When NATS detects trouble, the security indicator lights up while ignition key is in the "ON" position.

Trouble Diagnoses (Cont'd)

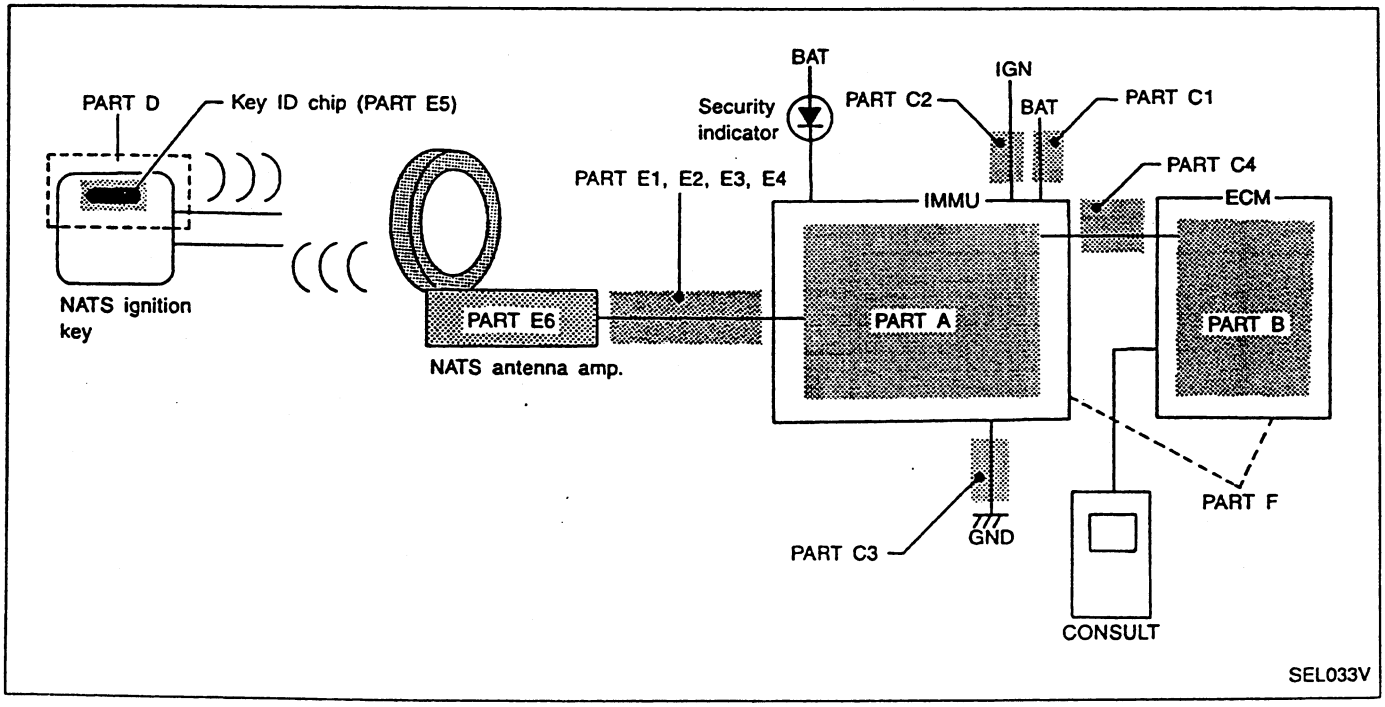
SYMPTOM	Displayed "SELF-DIAG RESULTS" on CONSULT screen.	DIAGNOSTIC PROCEDURE (Reference page)	SYSTEM (Malfunctioning part or mode)	REFERENCE PART NO. OF ILLUSTRATION ON NEXT PAGE
• Security indicator lighting up* • Engine hard to start	ID DISCORD, IMM-ECM	PROCEDURE 6 (EL-15)	System initialisation has not yet been completed.	F
			ECM	F
	ELECTRONIC NOISE	PROCEDURE 7 (EL-16)	Noise interference in communication line	—
	LOCK MODE	PROCEDURE 9 (EL-18)	LOCK MODE	D
• MIL staying ON • Security indicator lighting up*	DON'T ERASE BEFORE CHECKING ENG DIAG	WORK FLOW (EL-7)	Engine trouble data and NATS trouble data have been detected in ECM	—

*: When NATS detects trouble, the security indicator lights up while ignition key is in the "ON" position.

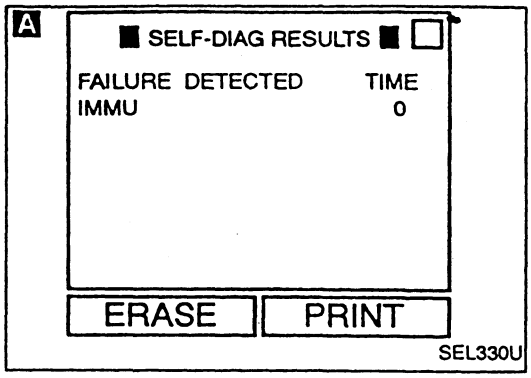
SYMPTOM MATRIX CHART 2 (Non self-diagnosis related item)

SYMPTOM	DIAGNOSTIC PROCEDURE (Reference page)	SYSTEM (Malfunctioning part or mode)
Security ind. does not light up.	PROCEDURE 8 (EL-17)	Security ind.
		Open circuit between Fuse and NATS IMMU
		Continuation of initialization mode
		NATS IMMU

DIAGNOSTIC SYSTEM DIAGRAM



Trouble Diagnoses (Cont'd)



DIAGNOSTIC PROCEDURE 1

Self-diagnostic results:
"IMMU" displayed on CONSULT screen

A

Confirm SELF-DIAGNOSTIC RESULTS "IMMU" displayed on CONSULT screen.
Ref. part No.* A.

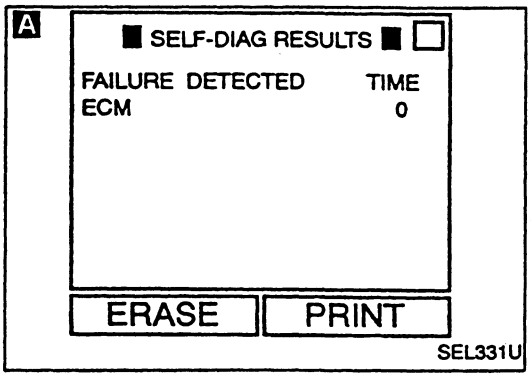
↓ Yes

Replace IMMU.

↓

Perform initialisation with CONSULT.
For the operation of initialization, refer to "CONSULT operation manual NATS".

* Ref. part No.: reference part No. of Diagnostic System Diagram on EL-9.



DIAGNOSTIC PROCEDURE 2

Self-diagnostic results:
"ECM" displayed on CONSULT screen

A

Confirm SELF-DIAGNOSTIC RESULTS "ECM" displayed on CONSULT screen.
Ref. part No. B.

↓

Replace ECM.

↓

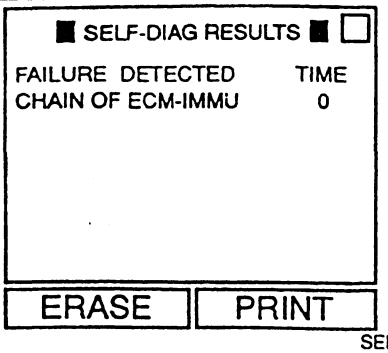
Perform initialization with CONSULT.
For the operation of initialization, refer to "CONSULT operation manual NATS".

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 3

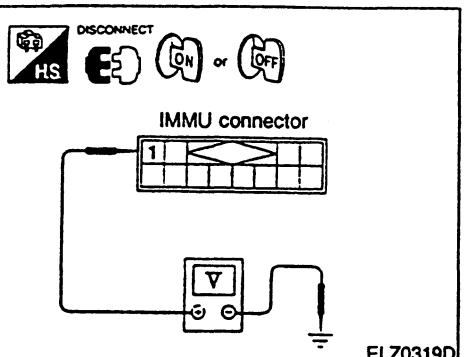
Self-diagnostic results:
"CHAIN OF ECM-IMMU" displayed on CONSULT screen

A



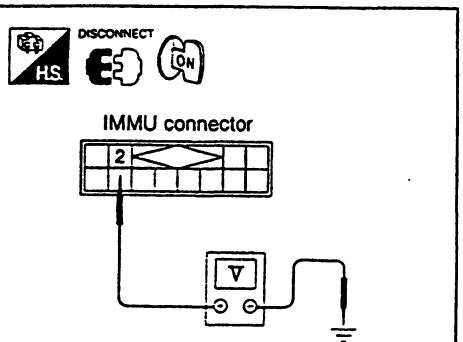
SEL333U

B



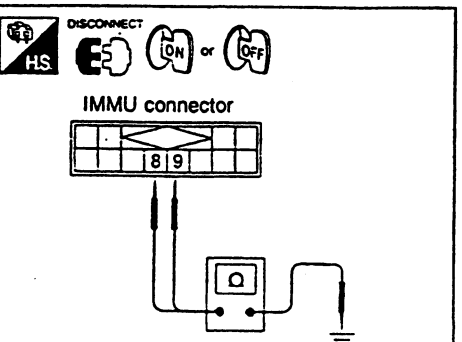
ELZ0319D

C



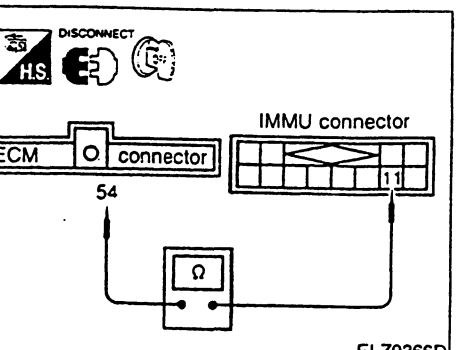
ELZ0320D

D



ELZ0321D

E



ELZ0366D

A

Confirm SELF-DIAGNOSTIC RESULTS "CHAIN OF ECM-IMMU" displayed on CONSULT screen.

OK ↓

B

Check voltage between terminal ① of IMMU and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following:
- 10A fuse [No. 44], located in the fuse block (J/B)]
- Harness for open or short between fuse and IMMU connector

Ref. part No. C1

OK ↓

C

Check voltage between terminal ② of IMMU and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following:
- 10A fuse [No. 5], located in the fuse block (J/B)]
- Harness for open or short between fuse and IMMU connector

Ref. part No. C2

OK ↓

D

Check harness continuity between IMMU terminal ⑧ or ⑨ and ground.
Continuity should exist.

NG → Repair harness.
Ref. part No. C3

OK ↓

E

Check harness continuity between the following ECM terminal ㊿ and IMMU terminal ⑪.
Continuity should exist.

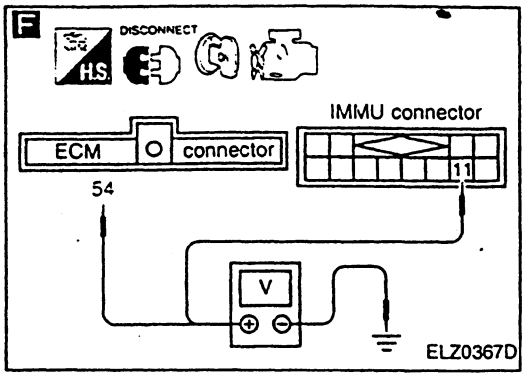
NG → Communication line is open circuit.
Repair harness or connectors.
Ref. part No. C4

OK ↓

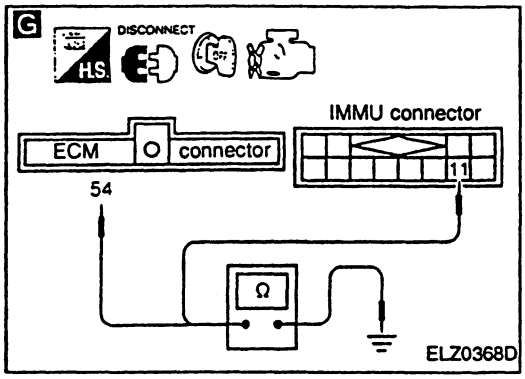
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Trouble Diagnoses (Cont'd)

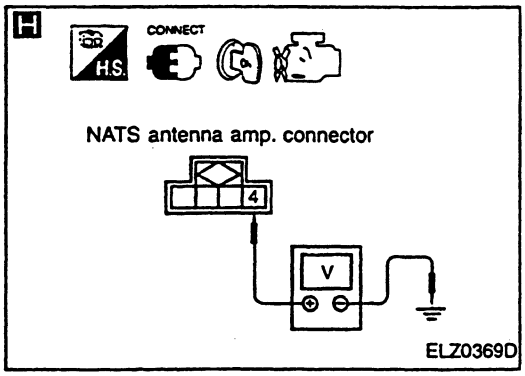
F



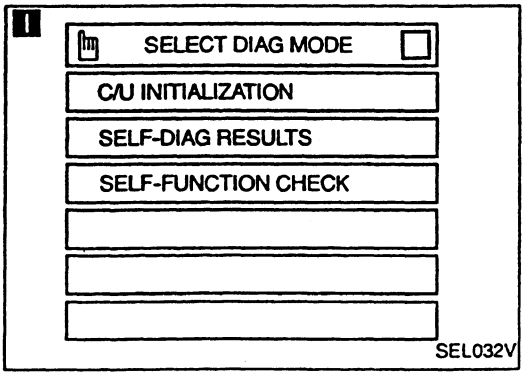
G



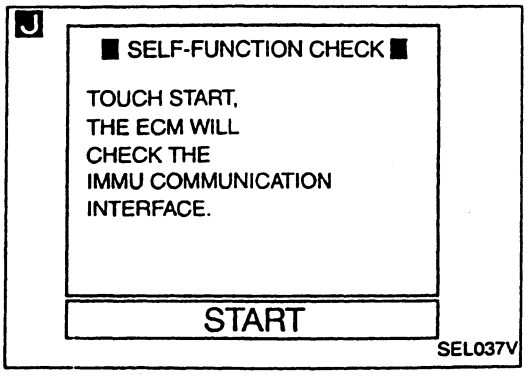
H



I



J



Ⓐ

F **CHECK COMMUNICATION LINE CIRCUIT.**

1. Disconnect ECM connector and IMMU connector.
2. Check voltage between the following terminals and ground.
 ECM ㊺ and IMMU ⑪
 Voltage: 0V

NG → Communication line is short-circuited with battery voltage line or ignition switch ON line.
Repair harness or connectors.
Ref. part No. C4

OK ↓

G Check continuity between the following terminals and ground.
ECM ㊺ and IMMU ⑪
Continuity should not exist.

NG → Communication line is short-circuited with ground line.
Repair harness or connectors.
Ref. part No. C4

OK ↓

H **CHECK POWER SUPPLY FOR NATS ANTENNA AMP.**

1. Connect IMMU connector and NATS antenna amp. connector.
2. Check voltage between NATS antenna amp. terminal ④ and ground (Power supply from NATS IMMU terminal ③) with analogue tester.
 Before turning ignition switch "ON"
 Voltage: 0V
 Just after turning ignition switch "ON"
 Pointer of tester should move.

NG → NATS antenna amp. +5V line is short-circuited with battery voltage line or ground line.
Repair harness or connectors.
Ref. part No. E3

OK ↓

I **SELF-FUNCTION CHECK**

1. Connect ECM connector and disconnect IMMU connector.
2. Turn ignition switch "ON".
3. Touch "SELF-FUNCTION CHECK" on CONSULT "SELECT DIAG MODE" screen.

J Touch "START". ECM will then check its communication interface by itself.

NG → **K** (See next page.)
ECM is malfunctioning.
Replace ECM.
Ref. part No. B

Perform initialisation with CONSULT. For the operation of initialization, refer to "CONSULT operation manual NATS".

OK
L (See next page.)

Ⓑ

Trouble Diagnoses (Cont'd)

K

SELF-FUNCTION CHECK

ECM's IMMU COMMUNICATION INTERFACE

*** *** NG *** ***

PRINT

SEL342U

L

SELF-FUNCTION CHECK

ECM's IMMU COMMUNICATION INTERFACE

*** *** OK *** ***

PRINT

SEL343U

A

SELF-DIAG RESULTS

FAILURE DETECTED	TIME
DIFFERENCE OF KEY	0

ERASE | PRINT

SEL344U

B

C/U INITIALIZATION

INITIALIZATION

STOPPED or FAILED

TURN IGN KEY SW "OFF" AND "ON", AFTER CONFIRMING SELF-DIAG RESULTS, PERFORM C/U INITIALIZATION AGAIN.

SEL038V

Ⓑ

IMMU is malfunctioning.
Replace IMMU.
Ref. part No. A

Perform initialization with CONSULT.
For the operation of initialization, refer to "CONSULT operation manual NATS".

DIAGNOSTIC PROCEDURE 4

Self-diagnostic results:
"DIFFERENCE OF KEY" displayed on CONSULT screen

A

Confirm SELF-DIAGNOSTIC RESULTS "DIFFERENCE OF KEY" displayed on CONSULT screen.

OK

Perform initialization with CONSULT.
Re-register all NATS ignition key IDs.
For the operation of initialization, refer to "CONSULT operation manual NATS".

Initialization with CONSULT incomplete or failed → B

Initialization completed

Start engine.

END
(Ignition key ID was unregistered.)
Ref. part No. D

B

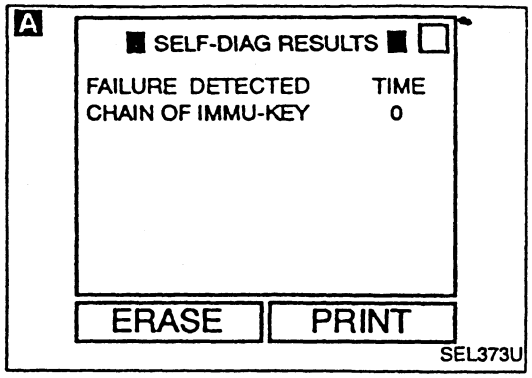
IMMU is malfunctioning.
Replace IMMU.
Ref. part No. A

Perform initialization with CONSULT.
For the operation of initialization, refer to "CONSULT operation manual NATS".

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 5

Self-diagnostic results:
"CHAIN OF IMMU-KEY" displayed on CONSULT screen

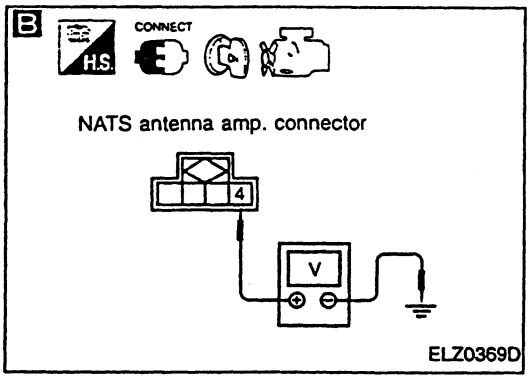


A

Confirm SELF-DIAGNOSTIC RESULTS "CHAIN OF IMMU-KEY" displayed on CONSULT screen.

OK ↓

Perform initialization with CONSULT. For the operation of initialization, refer to "CONSULT operation manual NATS".



CHECK NATS IGNITION KEY ID CHIP.
Start engine with another registered NATS ignition key.

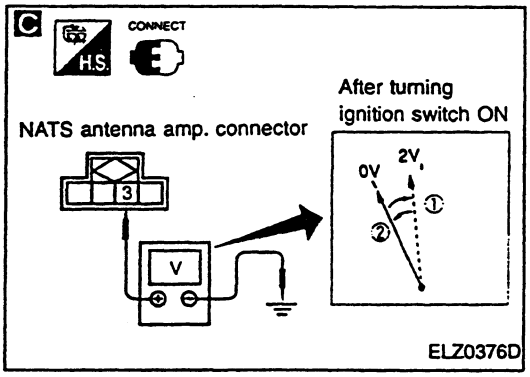
Start OK → Ignition key ID chip was malfunctioning. Replace the ignition key. **Ref. part No. E5**

Start NG ↓

CHECK NATS ANTENNA AMP. INSTALLATION.
Refer to "How to Replace NATS Antenna Amp." in EL-19.

NG → Reinstall NATS antenna amp. correctly.

OK ↓

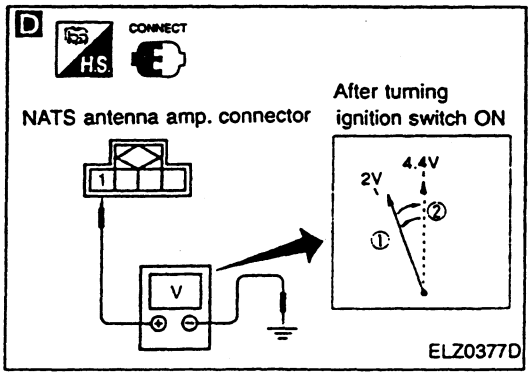


B

CHECK POWER SUPPLY FOR NATS ANTENNA AMP.
1. Connect IMMU connector and NATS antenna amp. connector.
2. Check voltage between NATS antenna amp. terminal ④ and ground (Power supply from NATS IMMU terminal ③) with analogue tester.
 Before turning ignition switch "ON"
 Voltage: 0V
 Just after turning ignition switch "ON"
 Pointer of tester should move.

NG → Check harness for open or short between for open or short between IMMU and NATS antenna amp. If harness is OK, replace IMMU, perform initialisation with CONSULT.
For the initialisation procedure, refer to "CONSULT operation manual NATS".

OK ↓



C

CHECK SIGNAL LINE 1 BETWEEN IMMU AND NATS ANTENNA AMP.
Check voltage between NATS antenna amp. terminal ③ and ground with analogue tester. Before turning ignition switch "ON"
Voltage: 0V
Just after turning ignition switch "ON"
Pointer of tester should move.

NG → (Check harness for open or short between for open or short between IMMU and NATS antenna amp. If harness is OK, replace IMMU, perform initialisation with CONSULT. For the initialisation procedure, refer to "CONSULT operation manual NATS".)

OK ↓

D

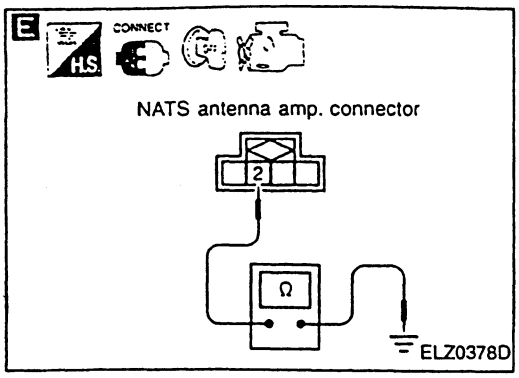
CHECK SIGNAL LINE 2 BETWEEN IMMU AND NATS ANTENNA AMP.
Check voltage between NATS antenna amp. terminal ① and ground with analogue tester. Before turning ignition switch "ON"
Voltage: 4.4V
Just after turning ignition switch "ON"
Pointer of tester should move.

NG → (Check harness for open or short between for open or short between IMMU and NATS antenna amp. If harness is OK, replace IMMU, perform initialisation with CONSULT. For the initialisation procedure, refer to "CONSULT operation manual NATS".)

OK ↓

Ⓐ

Trouble Diagnoses (Cont'd)



Ⓐ

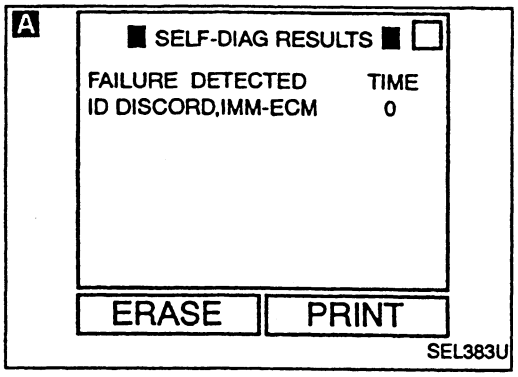
E

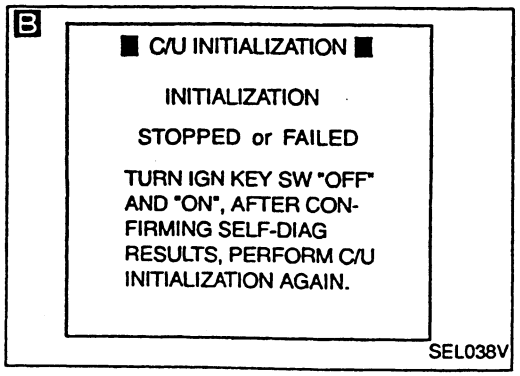
CHECK ANTENNA AMP. GROUND LINE CIRCUIT.
1. Turn ignition switch "OFF".
2. Check continuity between NATS antenna amp. terminal ② and ground. (Signal from NATS IMMU terminal ⑦) **Continuity should exist.**

NG → Check harness for open or short between IMMU and NATS antenna amp. If harness is OK, replace IMMU. After replacing IMMU, perform initialization with CONSULT. For the initialization procedure, refer to "CONSULT operation manual NATS".

OK ↓

NATS antenna amp. is malfunctioning. When replacing the amp. hold on to amp. body. Take care not to pull on amp. harness.





DIAGNOSTIC PROCEDURE 6

Self-diagnostic results:
"ID DISCORD, IMM-ECM" displayed on CONSULT screen

A

Confirm SELF-DIAGNOSTIC RESULTS "ID DISCORD, IMM-ECM"" displayed on CONSULT screen.

* "ID DISCORD, IMM-ECM": Registered ID of IMMU is in discord with that of ECM.

↓

Perform initialization with CONSULT.
Re-register all NATS ignition key IDs.
For the operation of initialization, refer to "CONSULT operation manual NATS".

Initialization with CONSULT incomplete or failed → B

B

ECM is malfunctioning.
Replace ECM.
Ref. part No. F

↓

Perform initialization with CONSULT.
For the operation of initialization, refer to "CONSULT operation manual NATS".

Initialization completed ↓

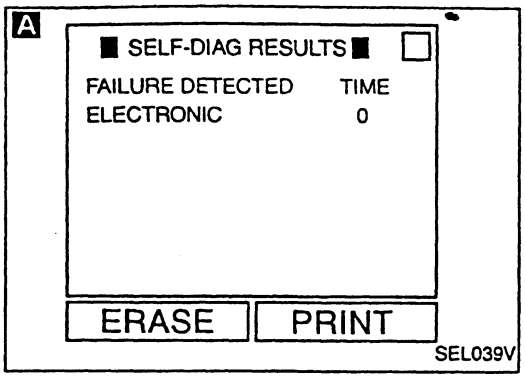
Start engine. ↓

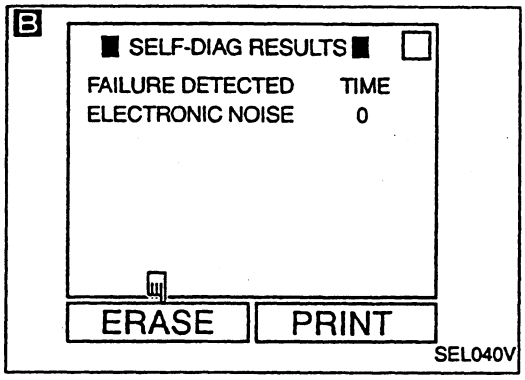
END
Ref. part No. F

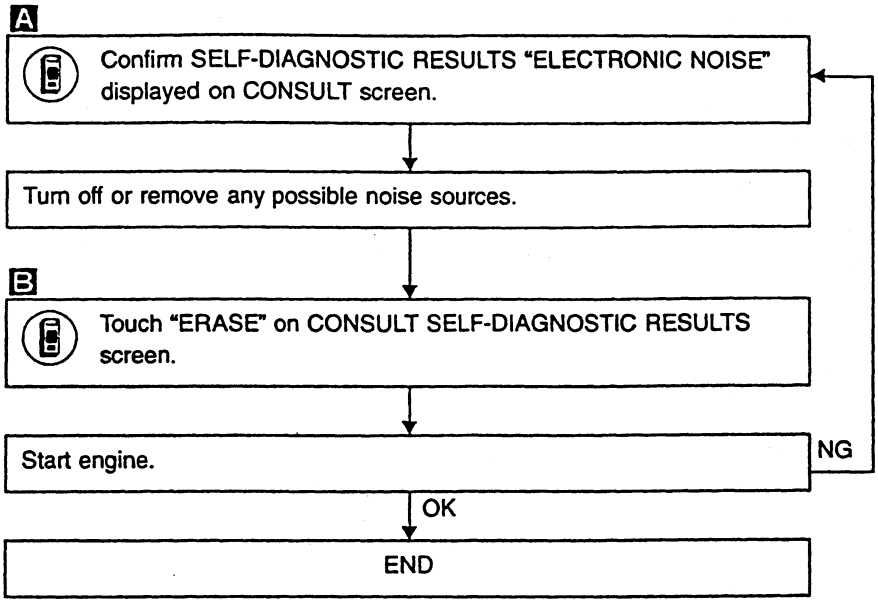
Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 7

Self-diagnostic results:
"ELECTRONIC NOISE" displayed on CONSULT screen







Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 8

"SECURITY IND. DOES NOT LIGHT UP"

Check 10A fuse [No. 28], located in the fuse block (J/B)]. — NG → Replace fuse.

OK ↓

NATS INITIALIZATION
1) Install the 10A fuse.
2) Perform initialization with CONSULT.
For the operation of initialization, refer to "CONSULT operation manual NATS".

↓

Turn ignition switch "OFF".

↓

Start engine and turn ignition switch "OFF".

↓

Check the security ind. lighting. — OK → END

NG ↓

A

Check voltage between security ind. connector terminal ① and ground.
Voltage: Battery voltage — NG → Check harness for open or short between fuse and security ind.

OK ↓

CHECK INDICATOR LAMP. — NG → Repair harness.

OK ↓

B

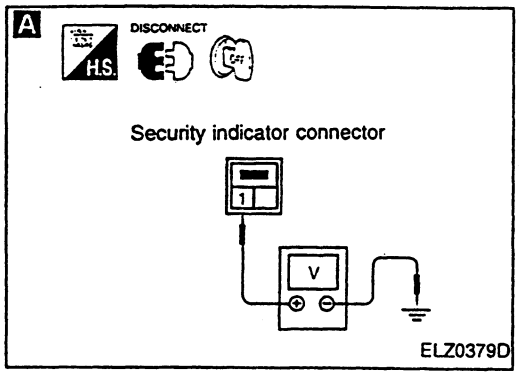
CHECK NATS IMMU FUNCTION.
1. Connect NATS IMMU connector.
2. Disconnect security ind. connector.
3. Check continuity between NATS IMMU terminal ⑥ and ground.
Continuity should exist intermittently. — NG → NATS IMMU is malfunctioning. Replace IMMU.

Perform initialization with CONSULT. For the operation of initialization, refer to "CONSULT operation manual NATS".

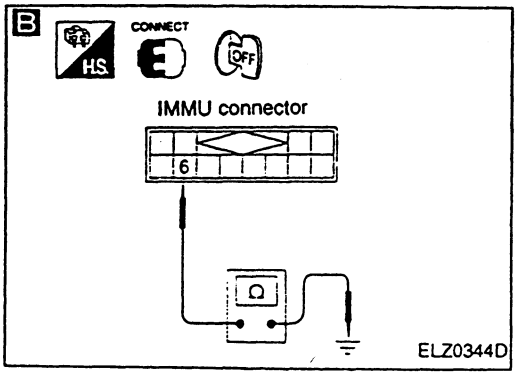
OK ↓

Check harness for open or short between security indicator and NATS IMMU.

A



B

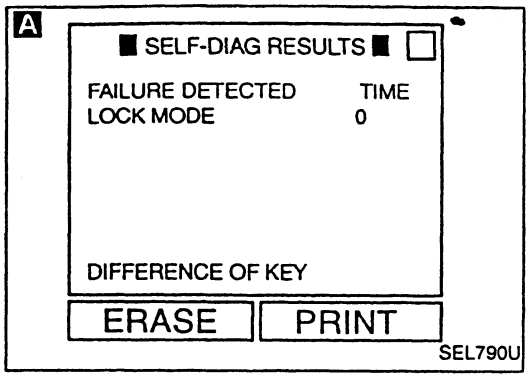


Trouble Diagnoses (Cont'd)

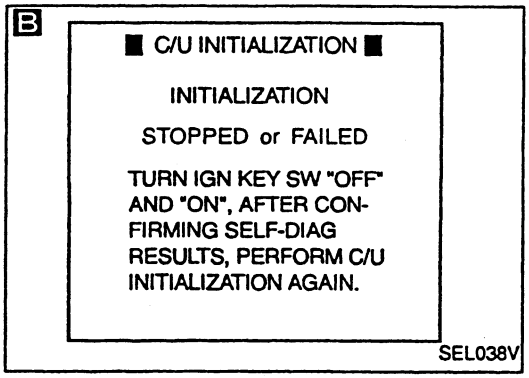
DIAGNOSTIC PROCEDURE 9

Self-diagnostic results: "LOCK MODE" displayed on CONSULT screen

A



B



A

Confirm SELF-DIAGNOSTIC RESULTS "LOCK MODE" is displayed on CONSULT screen.

1. Turn the ignition switch to OFF position.
2. Turn the ignition key switch to ON position with a registered key. (Do not start engine.) Wait for 5 seconds.
3. Return the key to the OFF position.
4. Repeat steps 2 and 3 twice (total of three cycles).
5. Start the engine.

Can the engine start?

Yes → System is OK. (Now the system is escaped from "LOCK MODE".)

No

CHECK NATS ANTENNA AMP. INSTALLATION.
Refer to "How to Replace NATS Antenna Amp." in EL-19.

NG → Reinstall NATS antenna amp. correctly.

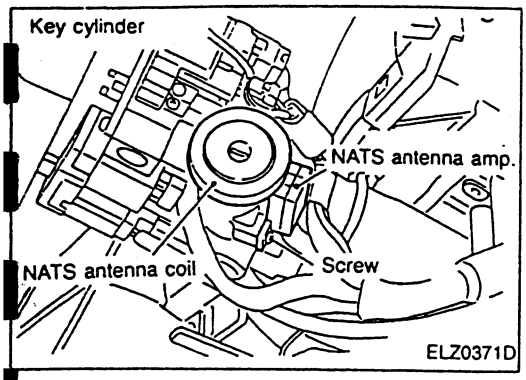
OK

PERFORM INITIALISATION
Perform initialisation with CONSULT.
For the initialisation procedure, refer to "CONSULT operation manual NATS V2.0".
Can the system be initialized?
Note: If the initialisation is incompleted or failed, CONSULT shows B message on the screen.

Yes → System is OK.

No

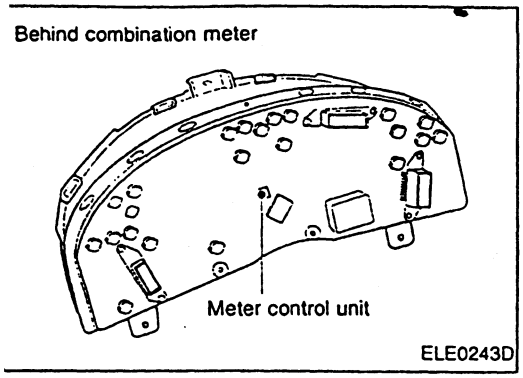
Go to DIAGNOSTIC PROCEDURE 5, EL-14 to check "CHAIN OF IMMU-KEY".



How to Replace NATS Antenna Amp.

NOTE:

- If NATS antenna amp. is not installed correctly, NATS system will not operate properly and SELF-DIAG RESULTS on CONSULT screen will show "LOCK MODE" or "CHAIN OF IMMU-KEY".
- Initialization is not necessary only when NATS antenna amp. is replaced with a new one.



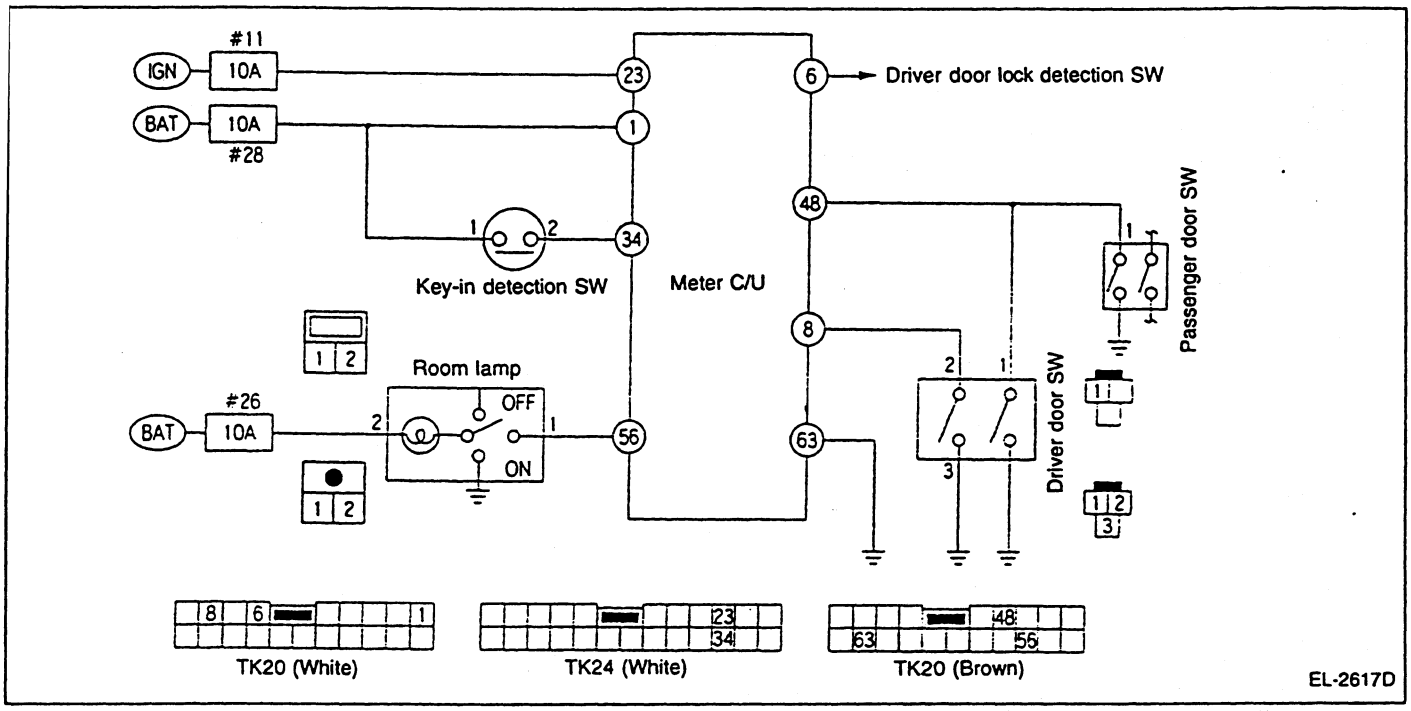
Component Parts Location

REMOVAL AND INSTALLATION

Parts included in this procedure:

- Column cover
- Cluster lid A
- Lighting switch or wiper/washer switch

Circuit Diagram



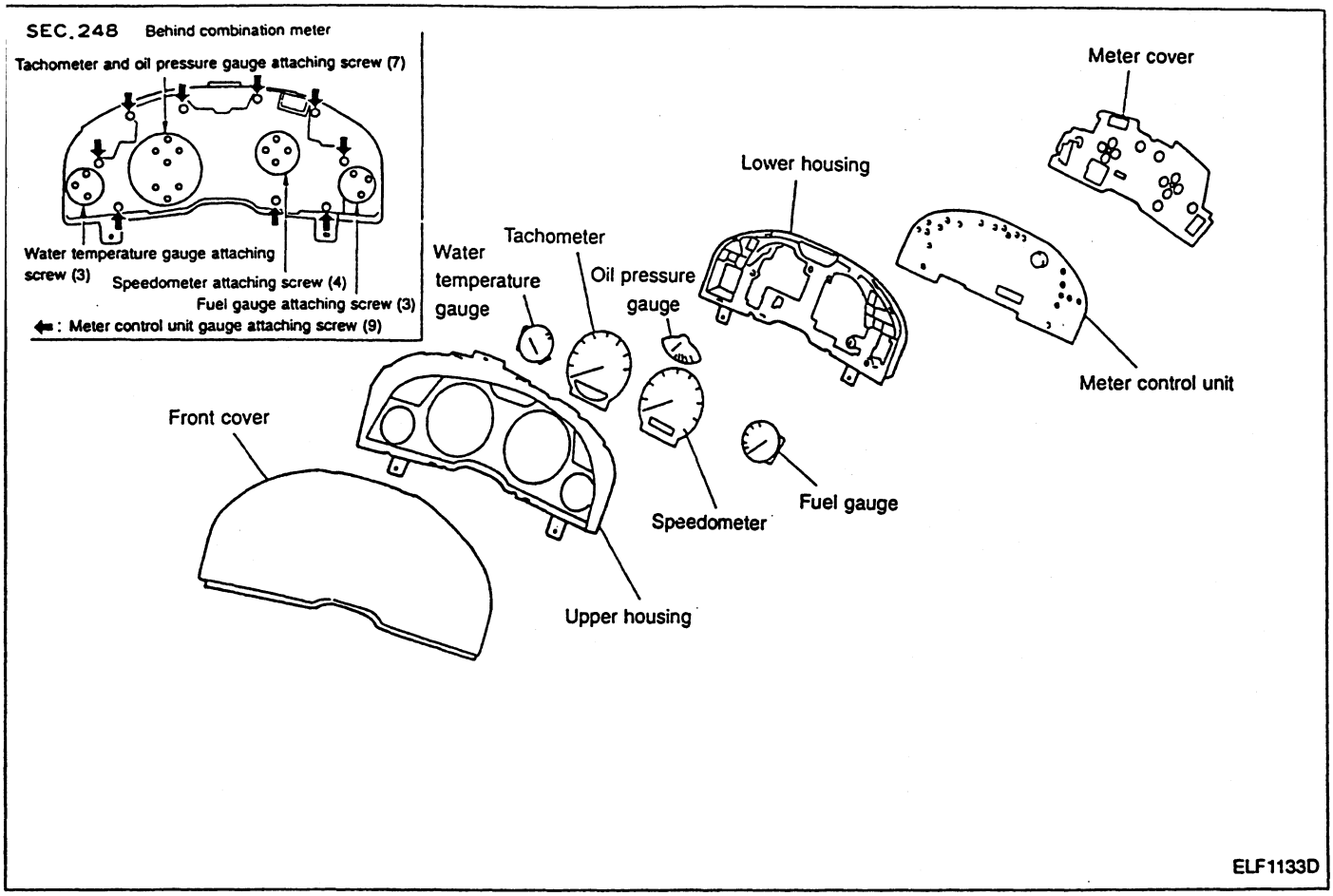
Meter Control Input/Output Specifications

Terminal No.	Signal name	Measuring condition				Specification
		Ignition switch	Operation or condition			
1	Battery	OFF	—			Approx. 12V
6	Driver door lock signal	OFF	Door is unlocked. (Switch ON)			Approx. 0V
			Door is locked. (Switch OFF)			Approx. 5V
8	Driver door switch signal	OFF	Driver door switch		ON (Open)	Approx. 0V
					OFF (Closed)	Approx. 12V
23	Ignition power supply	ON	—			Approx. 12V
34	Key-in detection switch	OFF	Remove the ignition key.			Approx. 0V
			Insert the ignition key.			Approx. 12V
48	Door switch signal	OFF	Open a door. (ON)			Approx. 0V
			Close all the doors. (OFF)			Approx. 12V
56	Room lamp signal	OFF	Room lamp switch: Neutral position	Insert the ignition key.	Each door switch: ON (Open)	Approx. 0V
					Each door switch: OFF (Closed)	Approx. 12V
		—	Room lamp switch: Neutral position	Close all the doors.	Remove the ignition key from the key cylinder.	Approx. 0V*
					Turn the ignition switch ON.	Approx. 12V
63	Ground	ON	—			Approx. 0V

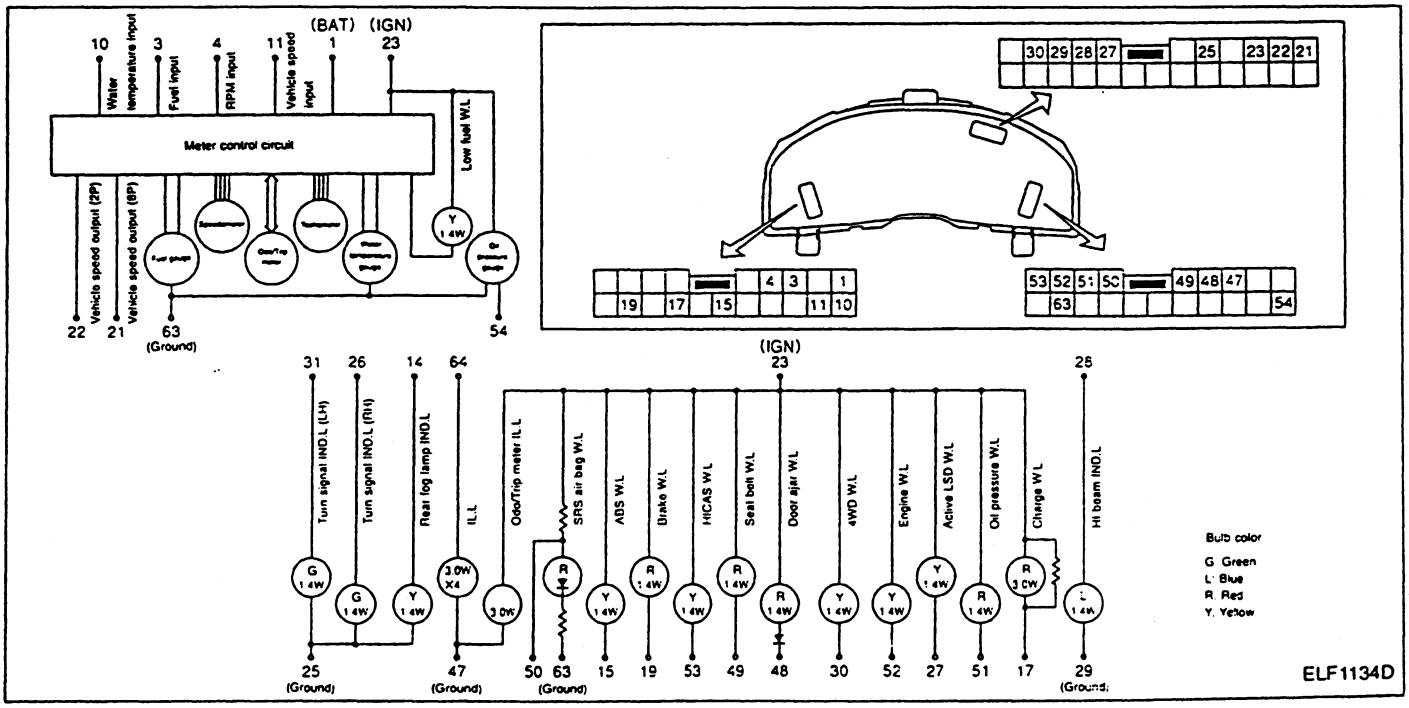
*: The voltage becomes approx. 12V approx. 20 seconds after the ignition key is removed.

Combination Meter

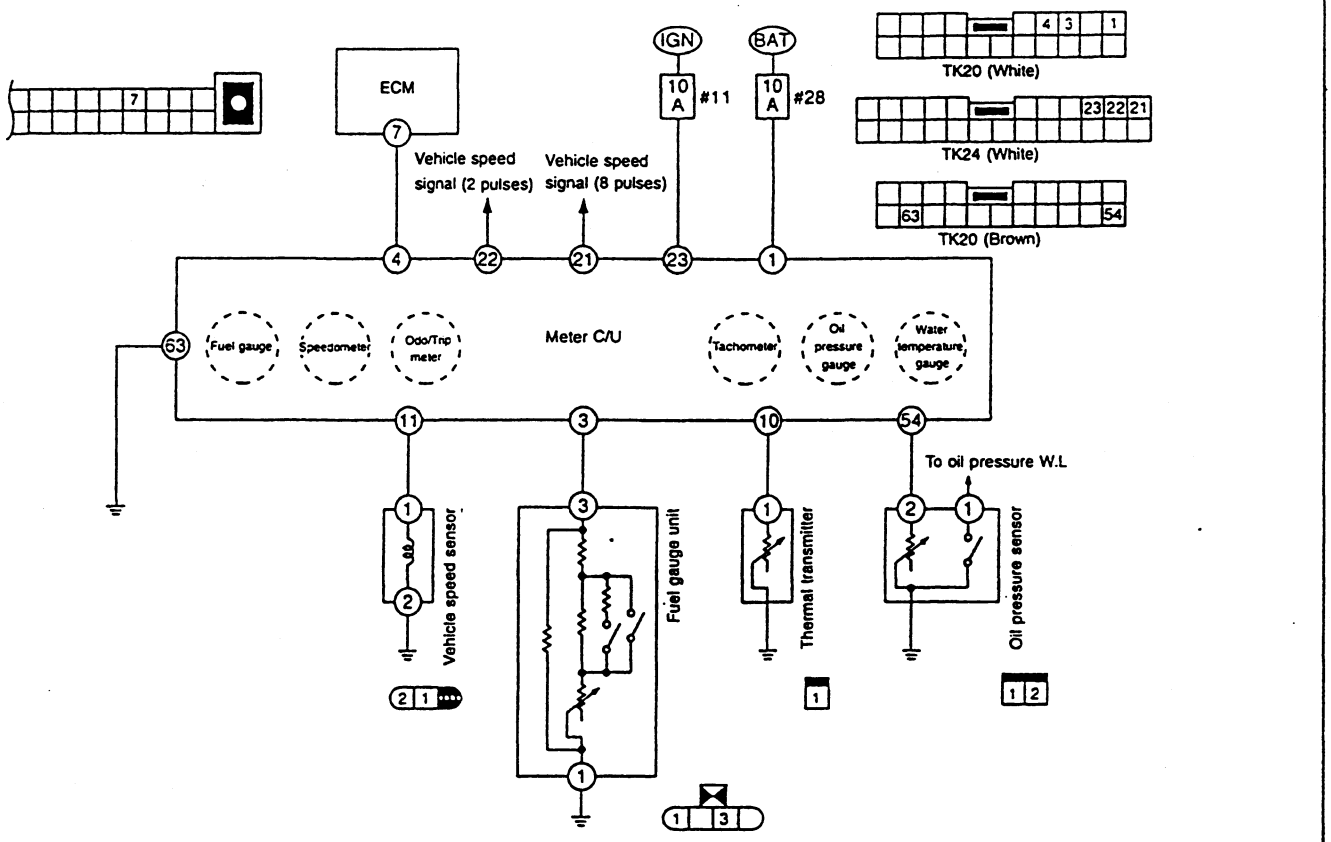
DISASSEMBLY AND ASSEMBLY



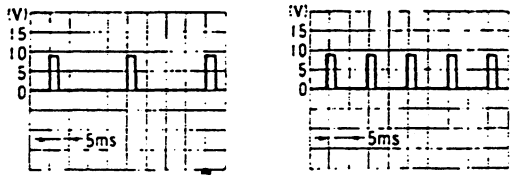
BEHIND COMBINATION METER AND INTERNAL CIRCUIT



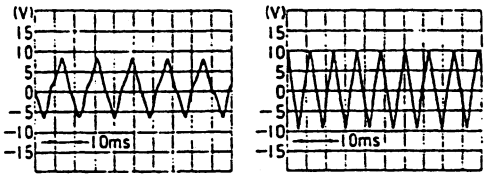
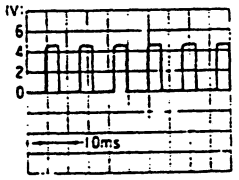
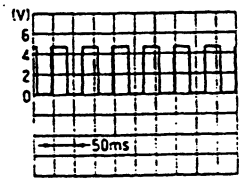
Meter-related Circuit Diagram

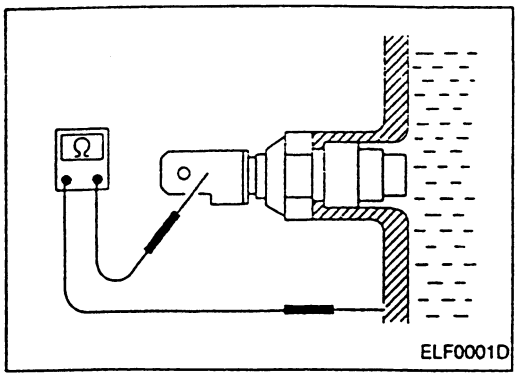


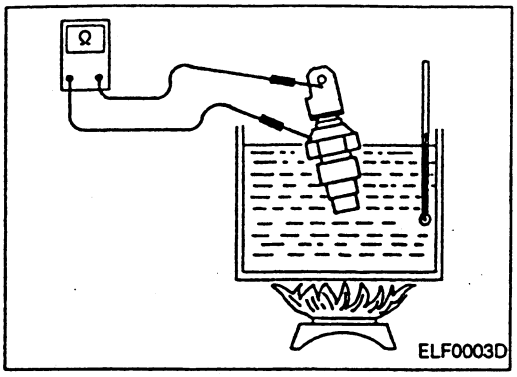
Combination Meter Input/Output Signal Specifications

Terminal No.		Signal name	Measuring condition		Specification
+	−		Ignition switch	Operation or condition	
1	Body ground	Battery	OFF	—	Approx. 12V
3		Fuel gauge signal	—	—	Refer to EL section in R34 Service Manual (SM8E-0R34J0).
4		Tachometer drive signal	ON	Engine is idling and running at approx. 2,000 rpm.	At idling: Approx. 1.0V At 2,000 rpm: Approx. 1.8V  ELF1136D
10		Water temperature signal	ON	Approx. 60°C	Approx. 5.6V
				Approx. 80°C	Approx. 3.6V
				Approx. 100°C	Approx. 2.3V

Combination Meter Input/Output Signal Specifications (Cont'd)

Terminal No. +	Terminal No. −	Signal name	Measuring condition: Ignition switch	Measuring condition: Operation or condition	Specification
11	Body ground	Vehicle speed input signal	ON	Speedometer is in operation. (Vehicle speed is approx. 40 km/h.) (Vehicle speed is approx. 60 km/h.)	Vehicle speed: Approx. 40 km/h / Vehicle speed: Approx. 60 km/h  ELF0975D
21		Vehicle speed signal (8 pulses)	ON	Speedometer is not in operation.	Approx. 4.5V
				Speedometer is in operation. (Vehicle speed is approx. 40 km/h.)	Vehicle speed is approx. 40 km/h: Approx. 1.4V  ELF1137D
22		Vehicle speed signal (2 pulses)	ON	Speedometer is not in operation.	Approx. 4.5V
				Speedometer is in operation. (Vehicle speed is approx. 40 km/h.)	Vehicle speed is approx. 40 km/h: Approx. 2.2V  ELF1138D
23		Ignition power supply	ON	—	Approx. 12V
54		Oil pressure signal	—	—	Refer to EL section in R34 Service Manual (SM8E-0R34J0).
63		Ground	ON	—	Approx. 0V





Component Parts Inspection

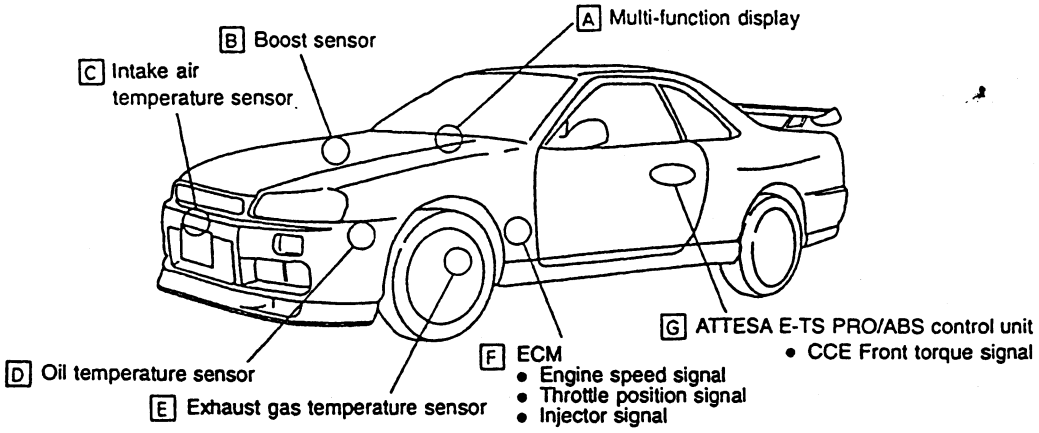
THERMAL TRANSMITTER

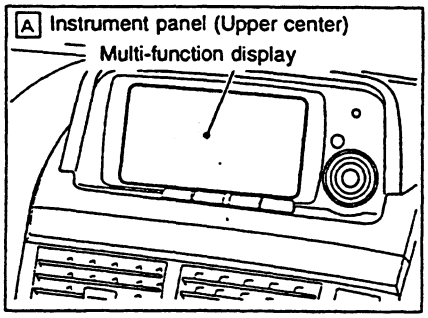
- When the engine has warmed up to approx. 80°C, measure resistance between thermal transmitter and body ground.
 Specification: Approx. 130Ω

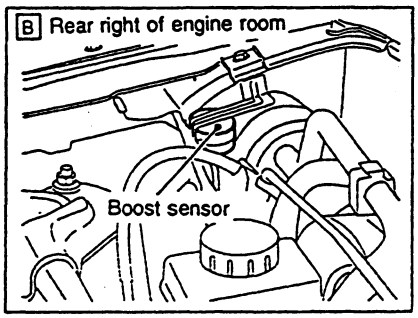
- If the measured resistance is out of the specification with the thermal transmitter on vehicle, remove the thermal transmitter from the vehicle and measure resistance as shown left.

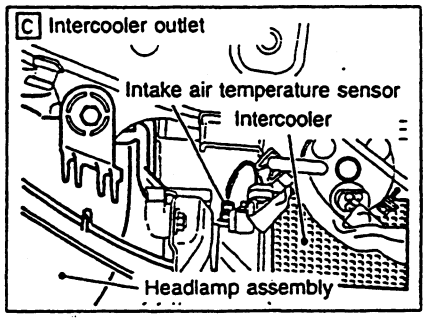
Water temperature °C	Resistance Ω
Approx. 60	Approx. 225
Approx. 80	Approx. 130
Approx. 100	Approx. 71

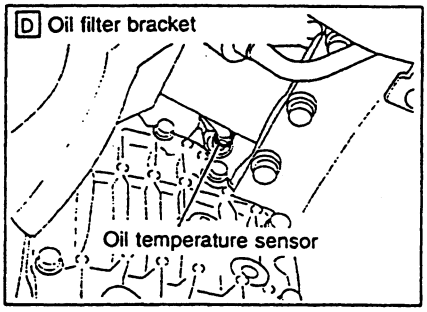
Component Parts

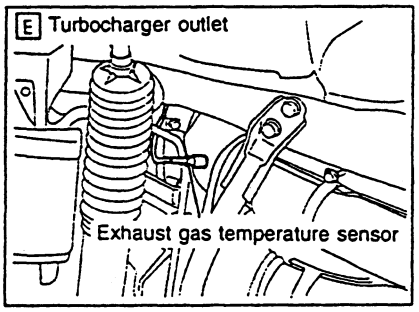


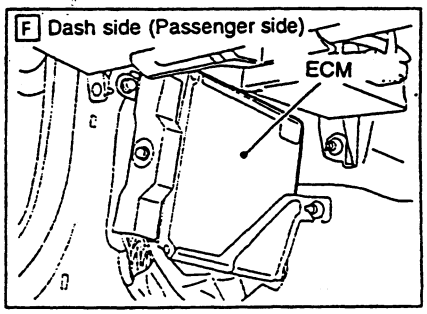


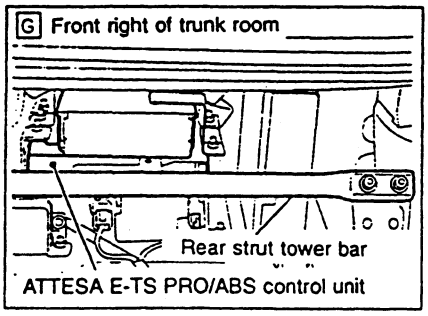




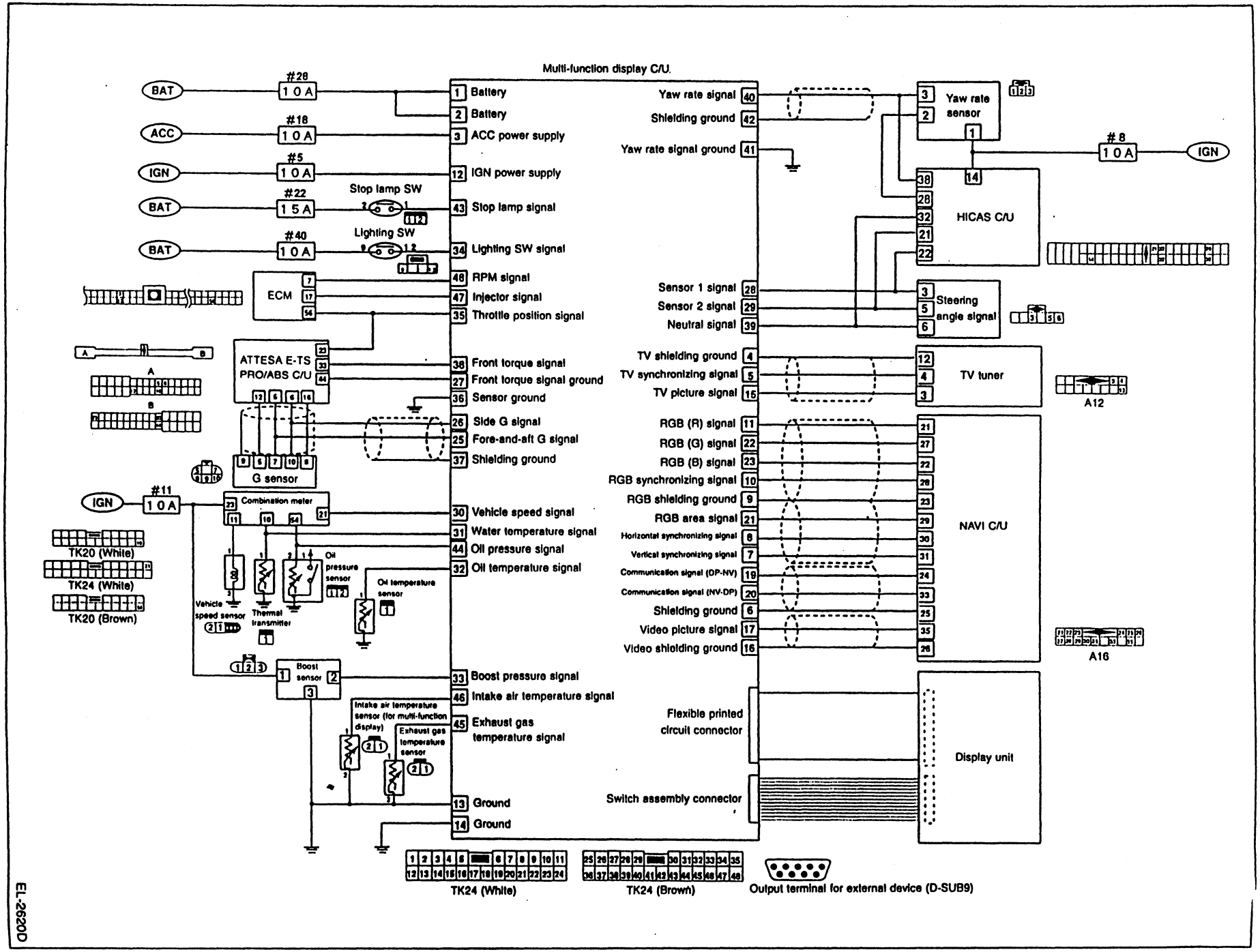






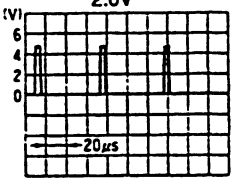
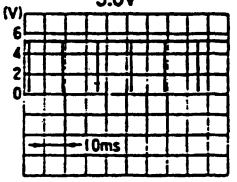
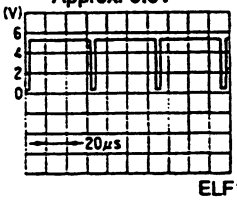
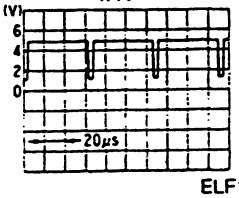
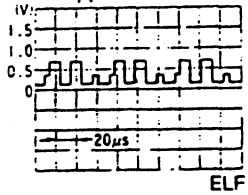


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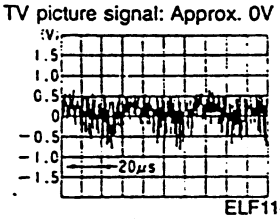
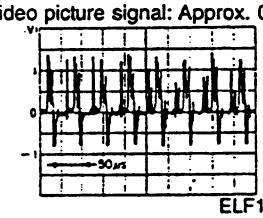
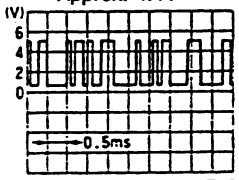
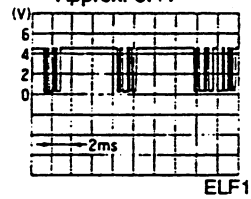
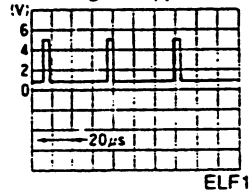
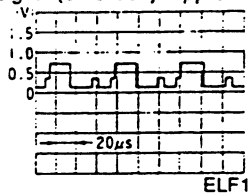
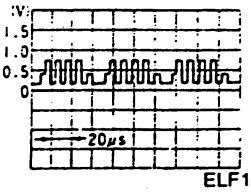

Multi-function display C/U
BAT
#28
10A
ACC
#18
10A
IGN
#5
10A
BAT
#22
15A
BAT
#40
10A
Stop lamp SW
Lighting SW
1 Battery
2 Battery
3 ACC power supply
12 IGN power supply
43 Stop lamp signal
34 Lighting SW signal
ECM
48 RPM signal
47 Injector signal
35 Throttle position signal
ATTESA E-TS PRO/ABS C/U
38 Front torque signal
27 Front torque signal ground
36 Sensor ground
G sensor
26 Side G signal
25 Fore-and-aft G signal
37 Shielding ground
IGN
#11
10A
Combination meter
30 Vehicle speed signal
31 Water temperature signal
44 Oil pressure signal
32 Oil temperature signal
TK20 (White)
TK24 (White)
TK20 (Brown)
Oil pressure sensor
Oil temperature sensor
Vehicle speed sensor
Thermal transmitter
Boost sensor
33 Boost pressure signal
46 Intake air temperature signal
Intake air temperature sensor (for multi-function display)
Exhaust gas temperature sensor
45 Exhaust gas temperature signal
13 Ground
14 Ground
Yaw rate signal 40
Shielding ground 42
Yaw rate signal ground 41
Yaw rate sensor
#8
10A
IGN
HICAS C/U
Sensor 1 signal 28
Sensor 2 signal 29
Neutral signal 39
Steering angle signal
TV shielding ground 4
TV synchronizing signal 5
TV picture signal 15
TV tuner
A12
RGB (R) signal 11
RGB (G) signal 22
RGB (B) signal 23
RGB synchronizing signal 10
RGB shielding ground 9
RGB area signal 21
Horizontal synchronizing signal 8
Vertical synchronizing signal 7
Communication signal (DP-NV) 19
Communication signal (NV-DP) 20
Shielding ground 6
Video picture signal 17
Video shielding ground 16
NAVI C/U
A16
Flexible printed circuit connector
Switch assembly connector
Display unit
TK24 (White)
TK24 (Brown)
Output terminal for external device (D-SUB9)

EL-2620D

Multi-function Display Control Unit Input/Output Signal Specification

Terminal No. +	Terminal No. −	Signal name	Measuring condition: Ignition switch	Measuring condition: Operation or condition	Specification
1	Body ground	Battery	OFF	—	Approx. 12V
2					
3		ACC power supply	ACC	—	Approx. 12V
4		Shielding ground (TV signal)	ON	—	Approx. 0V
5		TV synchronizing signal	ON	Receive TV broadcast signal.	TV synchronizing signal: Approx. 2.0V  ELF141D
6		Shielding ground (communication signal)	ON	—	Approx. 0V
7		Vertical synchronizing signal	ON	Press on-screen switch during TV broadcast signal reception.	Vertical synchronizing signal: Approx. 5.0V  ELF1142D
8		Horizontal synchronizing signal	ON	Press on-screen switch during TV broadcast signal reception.	Horizontal synchronizing signal: Approx. 0.6V  ELF1143D
9		Shielding ground (RGB signal)	ON	—	Approx. 0V
10		RGB synchronizing signal	ON	Change display screen to "color balance" screen using on-screen check/ adjustment function.	RGB synchronizing signal: Approx. 4.4V  ELF1144D
11		RGB signal (R: Red)	ON	Change display screen to "color balance" screen using on-screen check/ adjustment function.	RGB synchronizing signal (R: Red): Approx. 0.1V  ELF1145D
12		Ignition power supply	ON	—	Approx. 12V
13		Ground	ON	—	Approx. 0V
14					

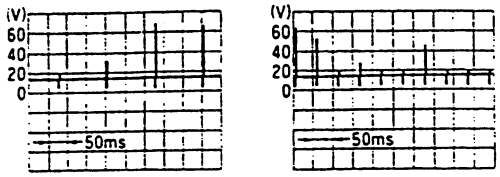
Multi-function Display Control Unit Input/Output Signal Specification (Cont'd)

Terminal No. +	Terminal No. −	Signal name	Measuring condition: Ignition switch	Measuring condition: Operation or condition	Specification
15	Body ground	TV picture signal	ON	Receive TV broadcast signal.	TV picture signal: Approx. 0V  ELF1146D
16		Shielding ground (video signal)	ON	—	Approx. 0V
17		Video picture signal	ON	Play back video.	Video picture signal: Approx. 0V  ELF1147D
19		Communication signal (DP-NV)	ON	Turn ignition switch from OFF to ON. (Meter screen on display)	Communication signal (DP-NV): Approx. 4.4V  ELF1148D
20		Communication signal (NV-DP)	ON	Press DISP switch. (NAVI screen on display)	Communication signal (NV-DP): Approx. 3.4V  ELF1149D
21		RGB area signal	ON	Press DISP switch. (TV screen on display)	RGB area signal: Approx. 0.7V  ELF1150D
22		RGB signal (G: Green)	ON	Change display screen to "color balance" screen using on-screen check/ adjustment function.	RGB signal (G: Green): Approx. 0.1V  ELF1151D
23		RGB signal (B: Blue)	ON	Change display screen to "color balance" screen using on-screen check/ adjustment function.	RGB signal (B: Blue): Approx. 0.1V  ELF1152D

Multi-function Display Control Unit Input/Output Signal Specification (Cont'd)

Terminal No. +	Terminal No. −	Signal name	Measuring condition: Ignition switch	Measuring condition: Operation or condition		Specification
25	36	Fore-and-aft G signal	ON	Locate vehicle on flat surface.		Approx. 2.5V
26		Side G signal				
28	Body ground	Steering angle signal 1	ON	Turn steering wheel from Neutral to left and right more than 20°.		Approx. 0 - 5V
29		Steering angle signal 2				
30		Vehicle speed signal (8 pulses)	—	—		Refer to "Combination Meter Input/ Output Signal Specifications", "COMBINATION METER", EL-23.
31		Water temperature signal	—	—		Refer to "Combination Meter Input/ Output Signal Specifications", "COMBINATION METER", EL-23.
32		Oil temperature signal	ON	Approx. 70		Approx. 4.0V
				Approx. 90		Approx. 3.3V
				Approx. 110		Approx. 2.5V
33		Boost pressure signal	—	—		Refer to EL section in R34 Service Manual (SM8E-0R34J0).
34		Lighting switch signal	OFF	Lighting switch	ON	Approx. 12V
					OFF	Approx. 0V
35		Throttle position signal	ON	0%		Approx. 0.5V
				50%		Approx. 3V
				100%		Approx. 4V
37		Shielding ground (G sensor)	ON	—		Approx. 0V
38		Front torque signal	ON	0 kg-m		Approx. 0.6V
				10 kg-m		Approx. 2.5V
				30 kg-m		Approx. 3.5V
39		Steering angle signal (Neutral)	ON	Set steering wheel to Neutral.		Approx. 5V
40	41	Yaw rate signal	ON	Locate vehicle on flat surface.		Approx. 2.5V
42	Body ground	Shielding ground (yaw rate sensor)	ON	—		Approx. 0V
43		Stop lamp switch signal	OFF	Depress brake pedal.		Approx. 12V
				Release brake pedal.		Approx. 0V
44		Oil pressure signal	—	—		Refer to EL section in R34 Service Manual (SM8E-0R34J0).
45		Exhaust gas temperature signal	ON	Approx. 400°C		Approx. 5V
				Approx. 500°C		Approx. 4.5V
				Approx. 600°C		Approx. 3.5V
46		Intake air temperature signal	ON	Approx. 20°C		Approx. 4V
				Approx. 30°C		Approx. 3.7V
				Approx. 40°C		Approx. 3.3V

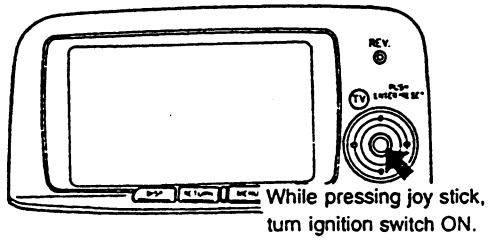
Multi-function Display Control Unit Input/Output Signal Specification (Cont'd)

Terminal No. +	Terminal No. −	Signal name	Measuring condition: Ignition switch	Measuring condition: Operation or condition	Specification
47	Body ground	Injector signal (fuel injection pulse)	ON	Engine at idle (throttle valve opening rate: approx. 1.3%) Engine operating at 2,000 rpm (throttle valve opening rate: approx. 3.0%)	At idling:Approx. 13V At 2,000 rpm: Approx. 12.5V  ELF1153D
48		Tachometer drive signal	—	—	Refer to "Combination Meter Input/Output Signal Specifications", "COMBINATION METER", EL-23.

Trouble Diagnoses Using Self-diagnostic Functions

DESCRIPTION

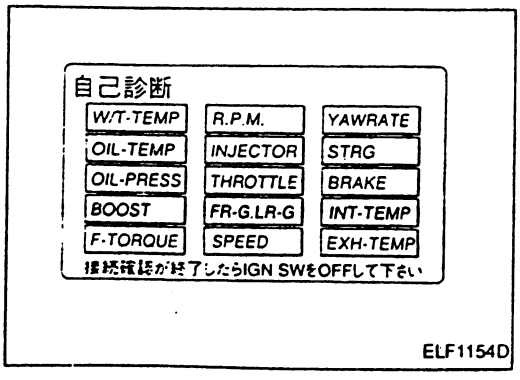
- The self-diagnostic function is mainly capable of checking whether or not the interconnecting circuits between the multi-display control unit, individual control units, sensors, etc. are shorted or otherwise faulty (poor contacts, etc.)
- If meter gauges become inoperative during vehicle operation, perform self-diagnostic procedures.



EL-2625D

SELF-DIAGNOSTIC PROCEDURE

1. Using meter display screen, turn ignition switch OFF.
2. While pressing joy stick, turn ignition switch ON. (Engine starts.)
3. After opening screen (GT-R logo) has appeared on display for more than 1 second, set joy stick to OFF.
4. Within 3 seconds after GT-R logo has appeared on display, press joy stick 5 times.



ELF1154D

5. The display screen will then be replaced by the screen shown in the figure at left. (At this point, shift-up indicator REV lamp also illuminates.)

CAUTION:
Be sure to perform the procedures with vehicle at standstill.

DIAGNOSTIC RESULT DISPLAY

Following diagnostic procedure, items detected as "in good order" are shown in green while those identified as "out of order" do not change their colors. Thus, poor connection contacts or shorted circuits are clearly identified. (REV lamp remains illuminated.)

Trouble Diagnoses Using Self-diagnostic Functions (Cont'd)

CAUTION:

- **Perform self-diagnostic procedures during engine warm-up.**
- **If meter display screen does not appear before ignition switch is turned OFF, self-diagnostic function cannot be performed. Before performing self-diagnostic function, make sure that meter display screen appears on display.**

INPUT SIGNAL DETERMINATION CONDITIONS

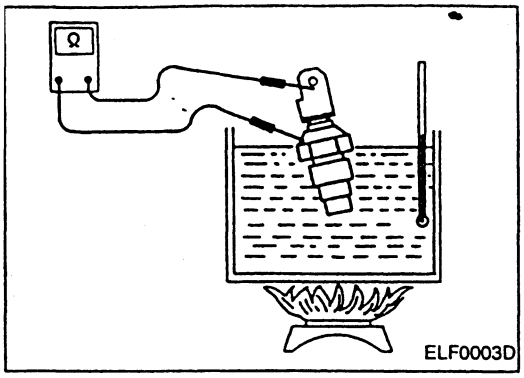
Multi-display control unit determines whether or not check items are in good order under individual conditions outlined in the Table below.

Item	Specification	Operation or conditions	Determination standard for faulty item
W/T-TEMP (Engine coolant temperature)	Approx. 10V or less	Specification has been detected for more than 1 second.	Specification has not been detected for more than 1 second during engine warm-up.
OIL-TEMP (Engine oil temperature)	Approx. 4.9V or less	Specification has been detected for more than 1 second.	Specification has not been detected for more than 1 second during engine warm-up.
OIL-PRESS (Engine oil pressure)	Approx. 8V or less	Specification has been detected for more than 1 second.	Specification has not been detected for more than 1 second during engine warm-up.
BOOST (Engine turbocharger pressure)	Approx. 0.8V or more	Specification has been detected for more than 1 second.	Specification has not been detected for more than 1 second during engine idle.
F-TORQUE (Front wheel rotating force distribution)	Approx. 0.5V or more	Specification has been detected for more than 1 second.	With vehicle located on flat surface, specification has not been detected for more than 1 second.
R.P.M. (Engine speed)	Approx. 600 rpm or more	During idling	Engine speed lower than specification has been detected.
INJECTOR (Fuel injection)	2% or more	Lightly depress accelerator pedal. (Engine at idle: approx. 1.3%)	Throttle opening rate is less than 2% measured with accelerator pedal depressed.
THROTTLE (Throttle opening position)	0.5V or more	Specification has been detected for more than 0.1 second.	With accelerator pedal fully released, specification has not been detected for more than 1 second.
FR-G. LR-G (Fore-and aft G, side G)	2V or more	Specification has been detected for more than 1 second.	With vehicle located on flat surface, specification has not been detected for more than 1 second.
SPEED (Vehicle speed)	2 km/h or more	Drive at a speed of more than 6 km/h.	Vehicle speed pulse signal has not been received while vehicle is being driven more than 6 km/h.
YAWRATE (Yaw rate)	2V or more	Specification has been detected for more than 1 second.	With vehicle located on flat surface, specification has not been detected for more than 1 second.
STRG (Steering angle)	5V or less	Turn steering wheel in either direction.	Pulse signal has not been received when steering wheel is turned more than 20° from Neutral.
BRAKE (Brake pedal ON/OFF)	8V or more	Depress brake pedal.	Specification has not been detected when brake pedal is depressed.
INT-TEMP (Intake air temperature)	4.5V or less (at intake air temperatures of more than 0°C)	Specification has been detected for more than 1 second.	Specification has not been detected for more than 1 second during engine warm-up.
EXH-TEMP (Exhaust gas temperature)	4.9V or less (at exhaust gas temperatures of more than 400°C)	Specification has been detected for more than 1 second.	Specification has not been detected for more than 1 second during engine warm-up.
Shift-up indicator (REV lamp)	ON	—	—

Trouble Diagnoses Using Self-diagnostic Functions (Cont'd)

SELF-DIAGNOSTIC CODE CHART

Item	Malfunctioning unit	Probable cause
W/T-TEMP (Engine coolant temperature)	Combination meter (Thermal transmitter)	• Multi-display control unit-to-thermal transmitter harness is faulty. • Thermal transmitter connector is loose (poor contacts) or thermal transmitter is faulty. (Refer to "Component Parts Inspection", EL-25.)
OIL-TEMP (Engine oil temperature)	Combination meter (Oil temperature sensor)	• Multi-display control unit-to-oil temperature sensor harness is faulty. • Oil temperature sensor connector is loose (poor contacts) or oil temperature sensor is faulty.
OIL-PRESS (Engine oil pressure)	Combination meter (Oil pressure sensor)	• Multi-display control unit-to-oil pressure sensor harness is faulty. • Oil pressure sensor connector is loose (poor contacts) or oil pressure sensor is faulty. Refer to EL section in R34 Service Manual (SM8E-0R34J0).
BOOST (Engine turbocharger pressure)	Boost sensor	• Multi-display control unit-to-boost sensor harness is faulty. • Boost sensor connector is loose (poor contacts) or boost sensor is faulty. Refer to EL section in R34 Service Manual (SM8E-0R34J0).
F-TORQUE (Front wheel rotating force distribution)	ATTESA E-TS PRO/ABS control unit (Wheel sensor)	• Multi-display control unit-to-ATTESA E-TS PRO/ABS control unit harness is faulty. • ATTESA E-TS PRO/ABS control unit connector is loose (poor contacts) or control system is faulty. Refer to BR section.
R.P.M. (Engine speed)	ECM (Crankshaft position sensor)	• Multi-display control unit-to-ECM harness is faulty. • ECM connector is loose (poor contacts) or control system is faulty. Refer to EC section.
INJECTOR (Fuel injection)	ECM (Injector)	• Multi-display control unit-to-ECM harness is faulty. • ECM connector is loose (poor contacts) or control system is faulty. Refer to EC section.
THROTTLE (Throttle opening position)	ECM (Throttle position sensor)	• Multi-display control unit-to-ECM harness is faulty. • ECM connector is loose (poor contacts) or control system is faulty. Refer to EC section.
FR-G. LR-G (Fore-and-aft G, side G)	ATTESA E-TS PRO/ABS control unit (G sensor)	• Multi-display control unit-to-G sensor harness is faulty. • G sensor connector is loose (poor contacts) or G sensor is faulty. Refer to BR section.
SPEED (Vehicle speed)	Combination meter (vehicle speed sensor)	• Multi-display control unit-to-combination meter harness is faulty. • Combination meter connector is loose (poor contacts) or control system is faulty. (Refer to "Combination Meter Input/Output Signal Specifications", EL-23.)
YAWRATE (Yaw rate)	HICAS control unit (Yaw rate sensor)	• Multi-display control unit-to-yaw rate sensor harness is faulty. • Yaw rate sensor connector is loose (poor contacts) or yaw rate sensor is faulty. Refer to BR section.
STRG (Steering angle)	HICAS control unit (Steering angle sensor)	• Multi-display control unit-to-steering angle sensor harness is faulty. • Steering angle sensor connector is loose (poor contacts) or steering angle sensor is faulty. Refer to ST section.
BRAKE (Brake pedal ON/OFF)	Stop lamp switch	• Multi-display control unit-to-stop lamp switch harness is faulty. • Stop lamp switch connector is loose (poor contacts) or stop lamp is faulty. (Refer to "Multi-display Control Unit Input/Output Signal Specifications", EL-28.)
INT-TEMP (Intake air temperature)	Intake air temperature sensor (for multi-function display)	• Multi-display control unit-to-intake air temperature sensor harness is faulty. • Intake air temperature sensor connector is loose (poor contacts) or intake air temperature sensor is faulty.
EXH-TEMP (Exhaust gas temperature)	Exhaust gas temperature sensor	• Multi-display control unit-to-exhaust gas temperature sensor harness is faulty. • Exhaust gas temperature sensor connector is loose (poor contacts) or exhaust gas temperature sensor is faulty.
Shift-up indicator (REV lamp)	—	• Multi-display control unit-to-switch assembly harness is faulty. • Multi-display control or unit switch assembly is faulty.



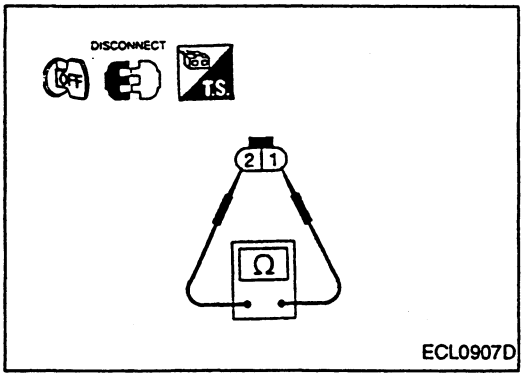
Component Parts Inspection

OIL TEMPERATURE SENSOR

Remove oil temperature sensor from vehicle and check it using the following table as a guide.

Oil temperature °C	Resistance Ω
Approx. 70	Approx. 105 - 121
Approx. 90	Approx. 57
Approx. 110	Approx. 31

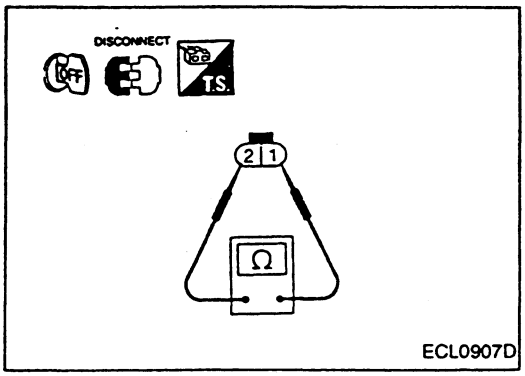
CAUTION:
Make sure that new engine oil is used in engine lubricating system.



INTAKE AIR TEMPERATURE SENSOR

- Remove connector from intake air temperature sensor.
- Remove intake air temperature sensor from vehicle. Measure resistance between terminals ① and ②.

Intake air temperature °C	Resistance Ω
Approx. 20	Approx. 2.5
Approx. 30	Approx. 1.7
Approx. 40	Approx. 1.2



EXHAUST GAS TEMPERATURE SENSOR

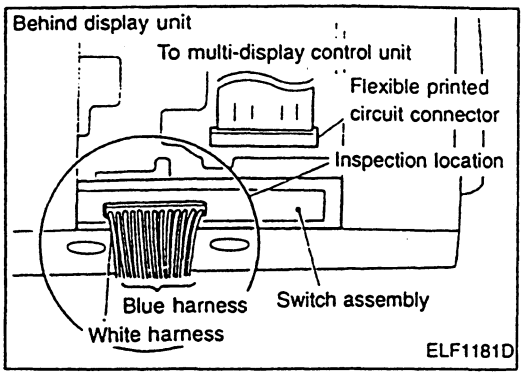
- Make sure that exhaust gas temperature sensor is at approximately room temperature.
- Remove connector from exhaust gas temperature sensor.
- Remove exhaust gas temperature sensor from vehicle. Measure resistance between terminals ① and ②.

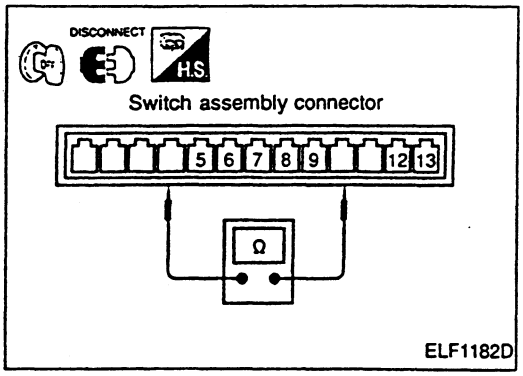
WARNING:
Exhaust gas temperature sensor and its surrounding area are hot immediately after engine has stopped. Allow exhaust gas temperature sensor to cool before removing it from vehicle.

Standard resistance:

Approx. 16 kΩ (at approx. 400°C) - ∞ (when engine is cold)

Component Parts Inspection (Cont'd)



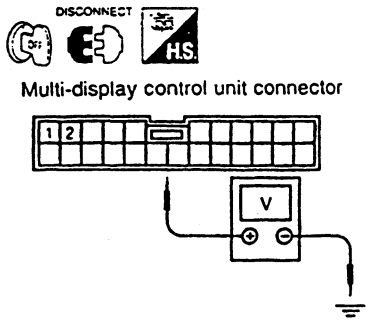


MULTI-FUNCTION DISPLAY SWITCH

- Remove multi-function display unit.
- Separate control unit from display unit.
- Turn each switch ON and check continuity between its corresponding terminals on rear side of display unit.

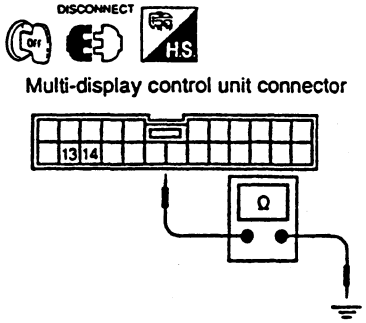
Item		Operation	Terminal No.	Continuity
DISP		ON	12 - 13	Yes
RETURN			9 - 13	
MODE			7 - 13	
MENU			8 - 13	
Joy stick	UP		6 - 7	
	DOWN		6 - 12	
	LEFT		6 - 9	
	RIGHT		6 - 8	
	PRESS		5 - 8	
TV			5 - 7	

A



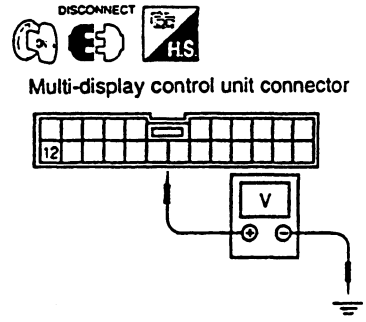
ELF1159D

B



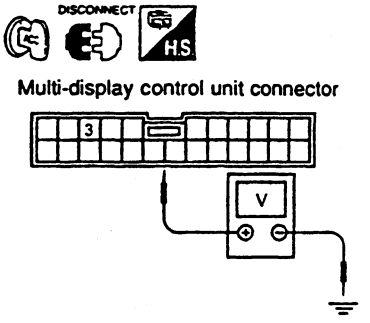
ELF1156D

C



ELF1155D

D



ELF1157D

Trouble Diagnosis by Symptom

SYMPTOM 1 — Image does not appear on display (meter, NAVI, TV, video, etc.).

SYMPTOM INSPECTION
Opening screen appears on display.
NG → Go to D.
OK ↓

A

CHECK MULTI-DISPLAY CONTROL UNIT POWER SUPPLY.
- Remove multi-display control unit connector (TK24, white).
- Check voltage between terminals ①, ② and ground.

Voltage: Battery voltage

NG → Multi-display control unit battery power harness is faulty.
OK ↓

B

CHECK MULTI-DISPLAY CONTROL UNIT GROUND CIRCUIT.
Measure resistance between terminals ⑬, ⑭ and ground.

Resistance: Approx. 0Ω

NG → Multi-display control unit ground harness is faulty.
OK ↓

C

CHECK MULTI-DISPLAY CONTROL UNIT IGNITION POWER SUPPLY.
- Remove multi-display control unit connector (TK24, white).
- Check voltage between terminal ⑫ and ground.

Voltage: Battery voltage

NG → Multi-display control unit ignition power supply harness is faulty.
OK ↓
Ⓐ

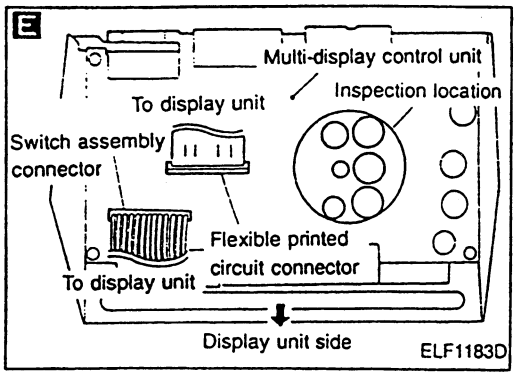
D

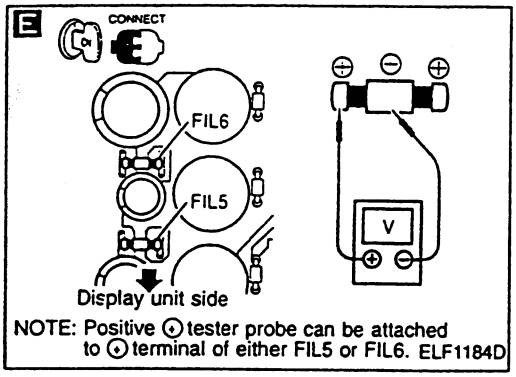
CHECK MULTI-DISPLAY CONTROL UNIT ACC POWER SUPPLY.
- Remove multi-display control unit connector (TK24, white).
- Check voltage between terminal ③ and ground

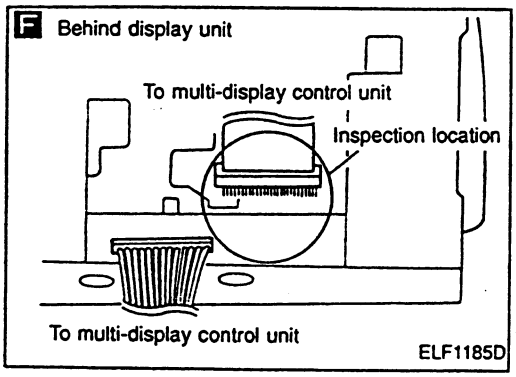
Voltage: Battery voltage

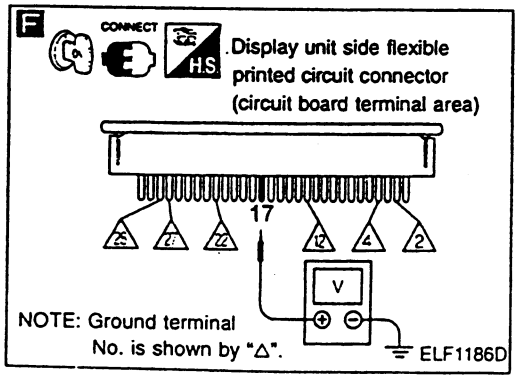
NG → Multi-display control unit ACC power supply harness is faulty.
OK ↓
Go to C.

Trouble Diagnosis by Symptom (Cont'd)









Ⓐ

PREPARATIONS
- Remove 4 display housing securing screws. (Do not remove connectors.)
- Remove 4 control unit upper case securing screws. Remove upper case.

SYMPTOM INSPECTION
Does back light illuminate?
- No → Check item E. If it checks out OK, display unit is faulty; if not, multi-display control unit is faulty.
- Yes ↓

E

CHECK POWER SUPPLY SYSTEM.
Measure each voltage of FIL5 and FIL6 as shown in the figure.
⊕ and ⊖: Approx. 9V
- NG → Multi-display control unit is faulty.
- OK ↓

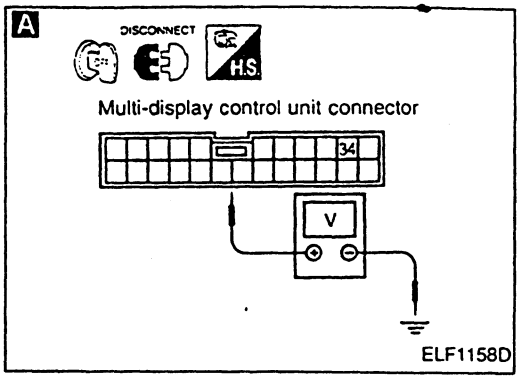
F

CHECK SIGNAL SYSTEM.
Measure voltage between connector (as shown in the figure) terminal ⑰ and ground.
Voltage: Approx. 5.3V
- NG → Display unit is faulty.
- OK ↓

Multi-display control unit is faulty.

CAUTION:
Be sure to vertically attach tester probe ⊕ to measure terminals at flexible printed circuit connector. Failure to do so may result in an internal short circuit to ground.

Trouble Diagnosis by Symptom (Cont'd)



SYMPTOM 2 — Lights do not dim in response to lighting switch operation.

LIGHT DIM SELECTION INSPECTION
Is night dim selector set to ON?
No → Set night dim selector to ON.
Yes

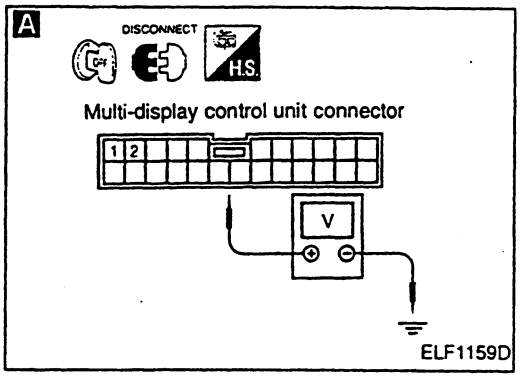
A

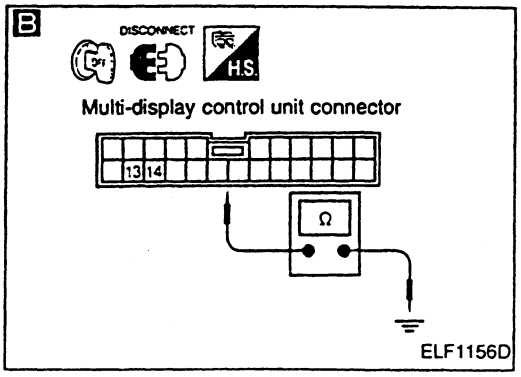
CHECK LIGHTING SWITCH SIGNAL.
- Remove multi-display control unit connector (TK24, brown).
- Operate lighting switch to measure voltage between terminal ㉞ and ground.

Lighting switch ON: Battery voltage
Lighting switch OFF: Approx. 0V

NG → Multi-display control unit-to-lighting switch harness is faulty.

OK → Go to E, "SYMPTOM 1".





SYMPTOM 3 — Previous meter data (meter display, select display, etc.) is not stored in memory.

A

CHECK MULTI-DISPLAY CONTROL UNIT POWER SUPPLY.
- Remove multi-display control unit connector (TK24, white).
- Measure voltage between terminals ①, ② and ground.

Voltage: Battery voltage

NG → Multi-display control unit. battery power harness is faulty.

OK

B

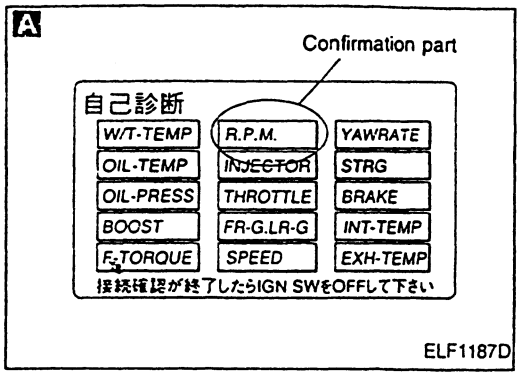
CHECK MULTI-DISPLAY CONTROL UNIT GROUND CIRCUIT.
Measure resistance between terminals ⑬, ⑭ and ground.
Resistance: Approx. 0Ω

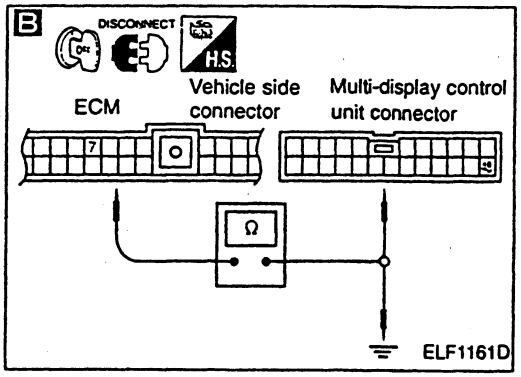
NG → Multi-display control unit ground harness is faulty.

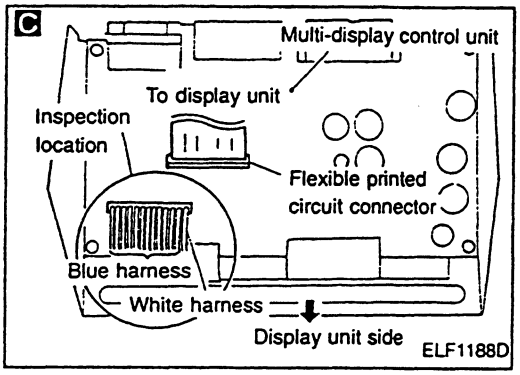
OK → Multi-display control unit is faulty.

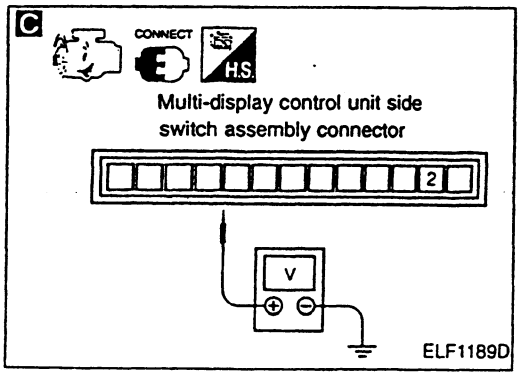
Trouble Diagnosis by Symptom (Cont'd)

SYMPTOM 4 — Shift-up indicator does not flash on and off although set speed is reached.









PERFORM SELF-DIAGNOSTIC PROCEDURES.
Refer to "Trouble Diagnoses Using Self-diagnostic Functions", EL-31.

↓

A

CHECK PROCEDURE
"R.P.M." is detected as correct.

NG → Go to **C** .

↓ OK

SYMPTOM INSPECTION
Tachometer (inside combination meter) is operating.

NG → Meter control unit, meter control unit-to-ECM harness or ECM control system is faulty. Refer to EC section.

↓ OK

B

CHECK HARNESS.
- Remove multi-display control unit connector (TK24, brown) and ECM harness.
- Check continuity between terminals ㊽ and ⑦, terminal ㊽ and ground.

Terminals ㊽ and ⑦: Continuity exists.
Terminal ㊽ and ground: Continuity does not exist.

NG → Multi-display control unit-to-ECM harness is faulty.

↓ OK

C

PREPARATIONS
- Remove 4 display securing screws. (All connectors must be connected.)
- Remove 4 control unit upper case securing screws, then upper case.

CHECK SIGNAL.
- Turn ignition switch ON and start engine.
- Check set value or set optional set value on shift-up indicator.
- Depress accelerator pedal to set value (engine speed) and measure voltage between terminal ② and ground.

Less than set value: Approx. 5V
More than set value: Approx. 0V

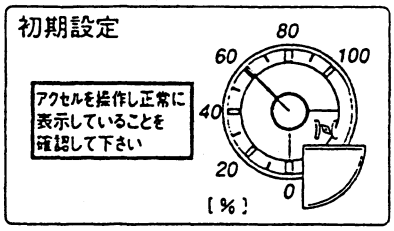
NG → Multi-display control unit is faulty.

↓ OK

Switch assembly is faulty.

Trouble Diagnosis by Symptom (Cont'd)

A



ELF1162D

SYMPTOM 5 — Only throttle position meter registers incorrect value. [0% (throttle fully closed) and 100% (throttle fully open) do not appear on display.]

A

PREPARATIONS
Perform initial throttle position adjustment procedures. Refer to next page.

NG → Throttle position sensor is faulty.

OK ↓

Turn ignition switch OFF.

SYMPTOM 6 — Display is not set in self-diagnosis or initial throttle position adjustment mode.

CHECK PROCEDURE
Does meter display appear before ignition switch is turned OFF?

No → Turn ignition switch OFF after meter display appears. Then repeat the self-diagnostic procedure.

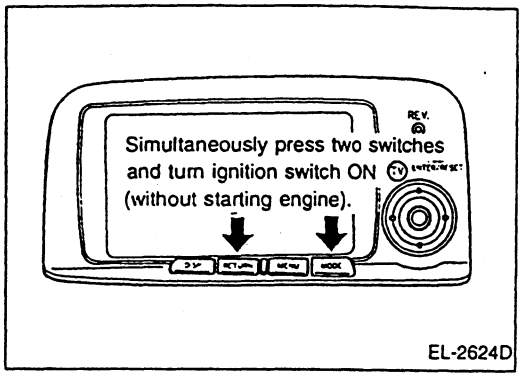
Yes ↓

CHECK COMPONENT PARTS.
Refer to "MULTI-FUNCTION DISPLAY SWITCH", EL-35.

NG → Switch assembly is faulty.

OK ↓

Multi-display control unit is faulty.

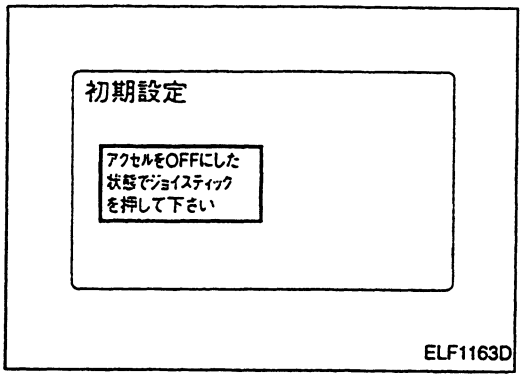


EL-2624D

Initial Throttle Position Adjustment

CAUTION:

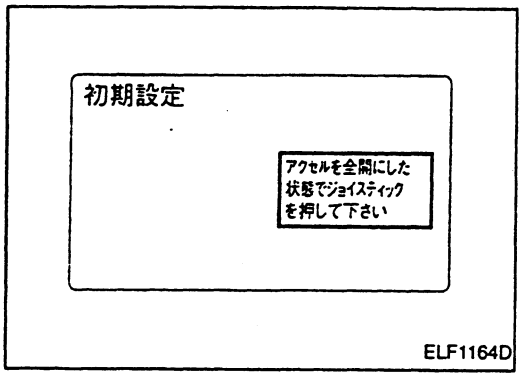
- **In adjustment mode, throttle position is set to 0% (accelerator pedal fully released) and 100% (accelerator pedal fully depressed). These two positions must correctly appear on display. Note that throttle positions cannot be optionally controlled.**
- **Before adjusting throttle positions, be sure to park vehicle on as smooth and flat a surface as possible.**



ELF1163D

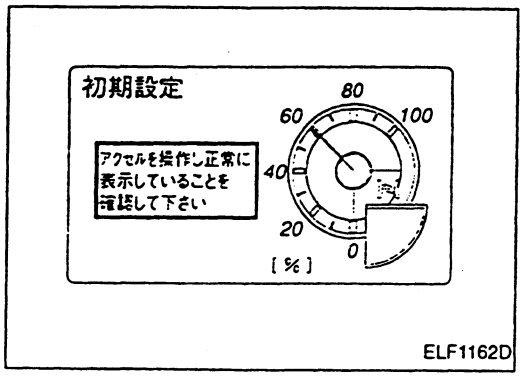
OPERATIONAL PROCEDURE

1. With meter screen on display, turn ignition switch OFF.
2. Simultaneously press RETURN and MODE switches while turning ignition switch from OFF to ON (without starting engine).
3. After GT-R logo has appeared, turn RETURN and MODE switches OFF. Within 3 seconds after the two switches have been turned OFF, press joy stick 5 times to call up adjustment screen on display.
4. Press joy stick with accelerator pedal fully released.



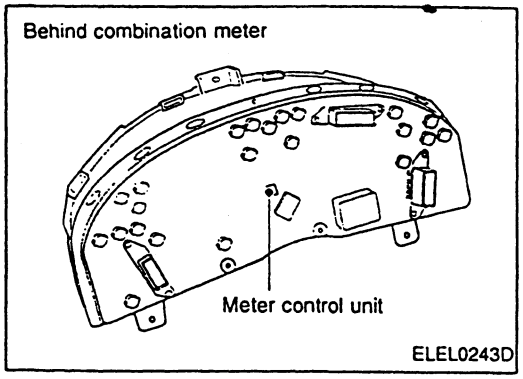
ELF1164D

5. Fully depress accelerator pedal and press joy stick.
 - Throttle position adjustment screen will appear on display.



ELF1162D

6. Make sure that correct throttle position rates appear on display. (Accelerator pedal fully released: 0%; accelerator pedal fully depressed: 100%) Turn ignition switch OFF.
 Turn ignition switch ON again so that meter screen appears on display.
 - The same meter screen as that previously shown before ignition switch is turned OFF appears on display.
 - **Initial throttle position adjustments can be made only when meter screen appears on display before ignition switch is turned OFF. Before initial throttle position adjustments, make sure that meter screen appears on display.**



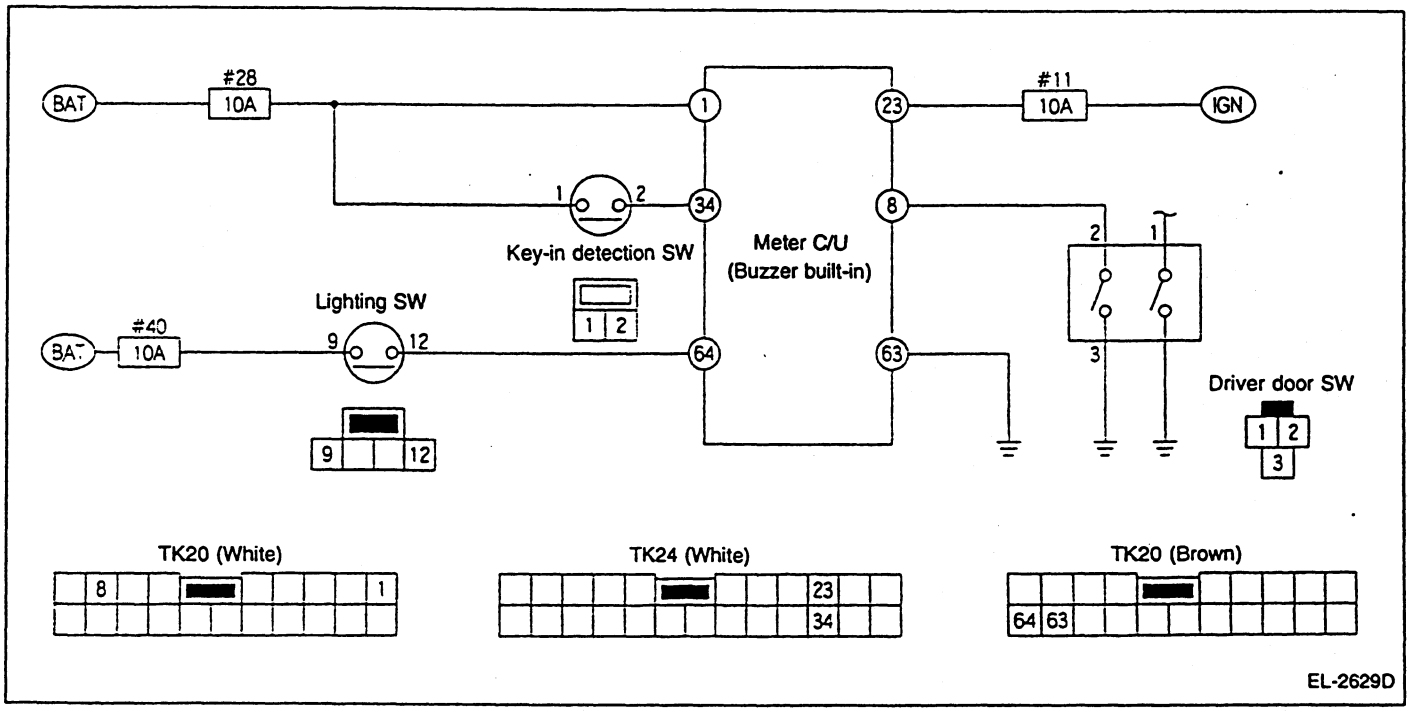
Component Parts Location

REMOVAL AND INSTALLATION

Parts included in this procedure:

- Column cover
- Cluster lid A
- Lighting switch or wiper/washer switch

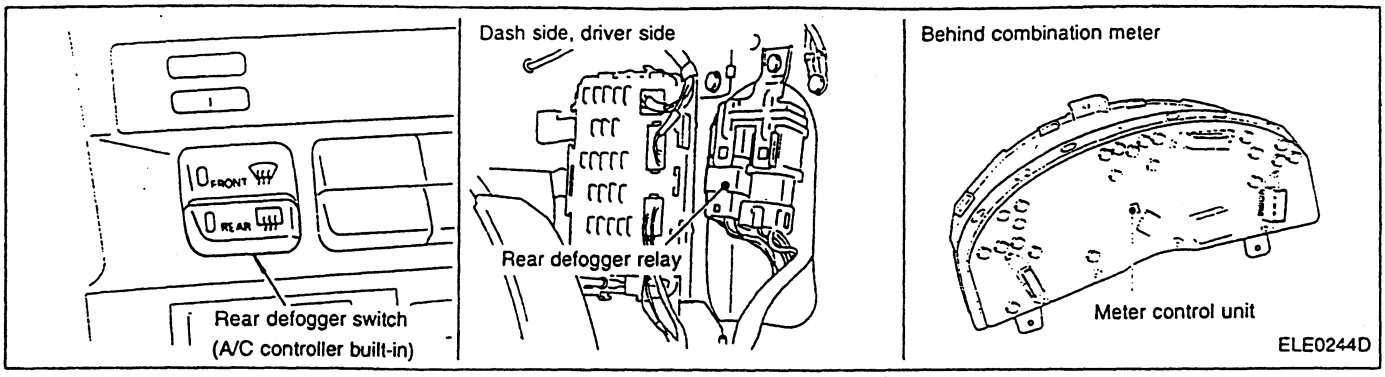
Circuit Diagram



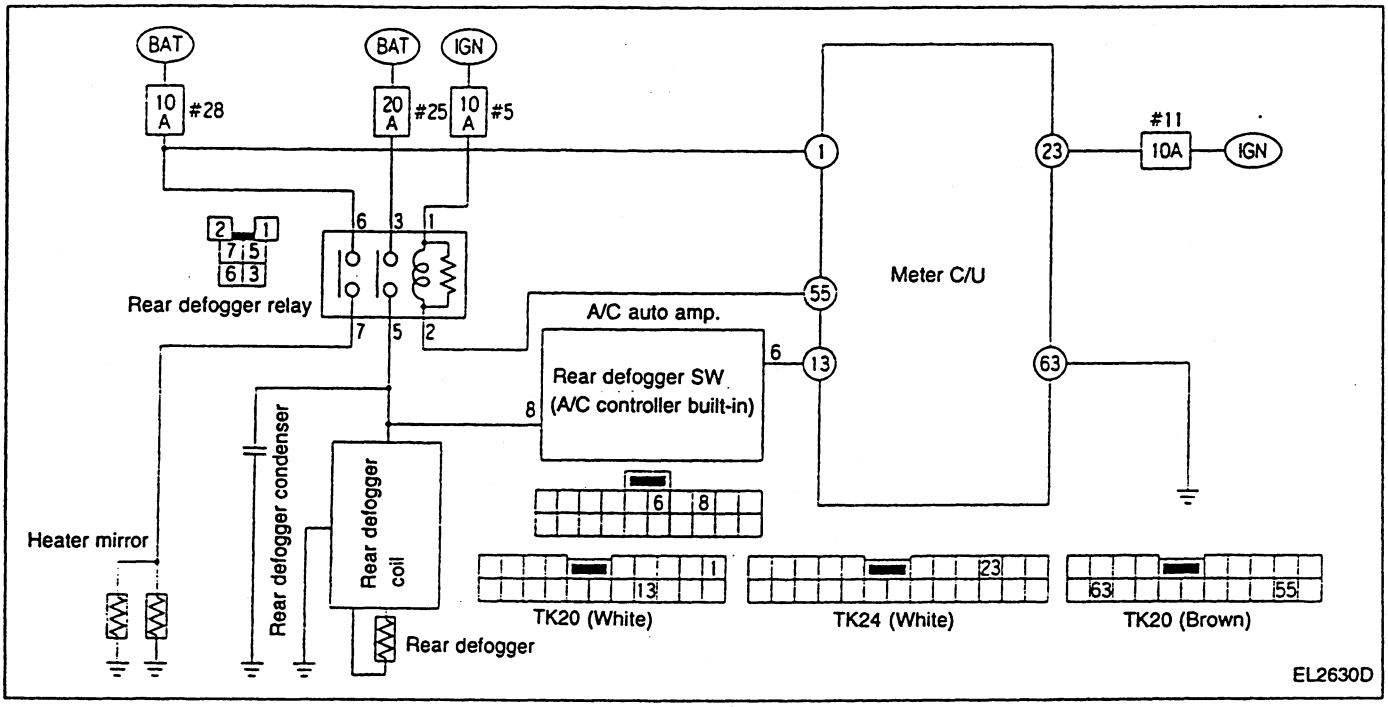
Meter Control Unit Input/Output Signal Specifications

Terminal No.	Signal name	Measuring condition			Specification
		Ignition switch	Operation or condition		
1	Battery	OFF	—		Approx. 12V
8	Driver door switch signal	OFF	Driver door switch	ON (Open)	Approx. 0V
				OFF (Closed)	Approx. 12V
23	Ignition power supply	ON	—		Approx. 12V
34	Key-in detection switch signal	OFF	Remove the ignition key.		Approx. 0V
			Insert the ignition key.		Approx. 12V
63	Ground	ON	—		Approx. 0V
64	Lighting switch signal	OFF	Lighting switch: 1ST	ON	Approx. 12V
				OFF	Approx. 0V

Component Parts Location



Circuit Diagram



Meter Control Unit Input/Output Signal Specifications

Terminal No.	Signal name	Measuring condition			Specification
		Ignition switch	Operation or condition		
1	Battery	OFF	—		Approx. 12V
13	Rear defogger switch signal	ON	Rear defogger switch	ON (with switch pushed)	Approx. 0V
				OFF (including when A/C auto amplifier is connected)	Approx. 5V
23	Ignition power supply	ON	—		Approx. 12V
55	Rear defogger relay control signal	ON	Rear defogger switch	ON	Approx. 0V*
				OFF	Approx. 12V
63	Ground	ON	—		Approx. 0V

*: Approx. 12V over 15 minutes after the switch is ON.

SERVICE DATA

SECTION SD

MODIFICATION NOTICE:
GT-R model has been added.

CONTENTS

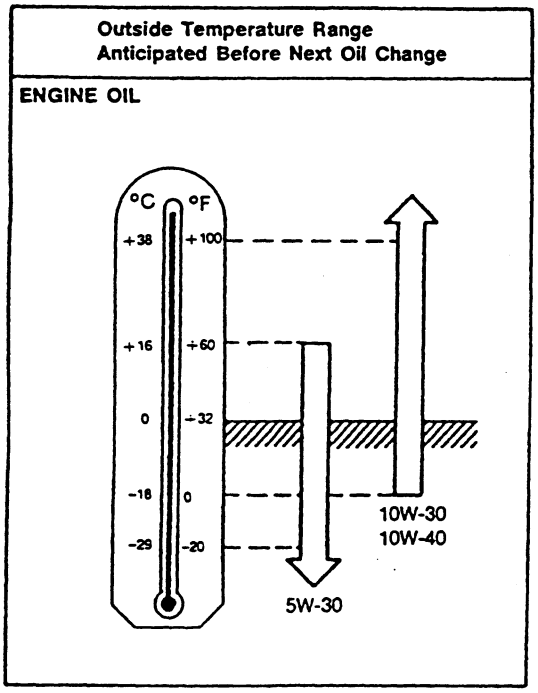
RECOMMENDED FLUIDS AND LUBRICANTS.....2
Fluids and Lubricants.....2
SAE Viscosity Number.....2
ENGINE MECHANICAL.....3
CLUTCH.....5
MANUAL TRANSMISSION.....6
TRANSFER.....7
REAR FINAL DRIVE.....8
DRIVE SHAFT.....10
AXLE & SUSPENSION.....11
ROAD WHEEL AND TIRE.....13
BRAKE.....14
STEERING.....15
SUPER HICAS.....16

Fluids and Lubricants

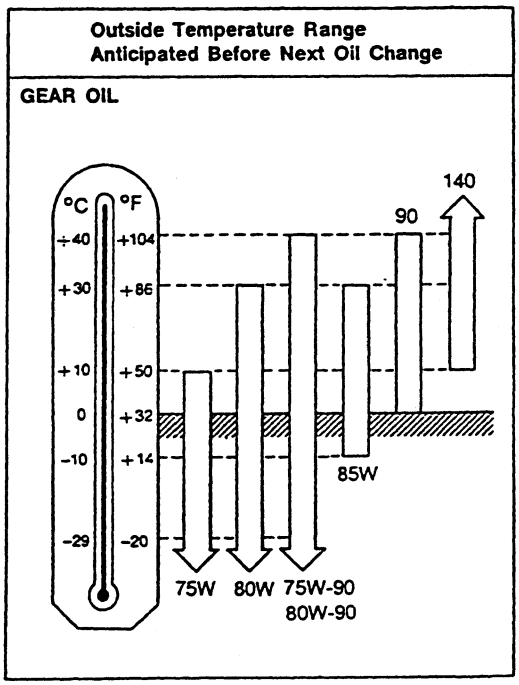
Engine oil	For turbo model: API SG, SH or SJ*1 Except for turbo model: API SE, SF, SG, SH or SJ*1
Cooling system	Anti-freeze coolant (Ethylene glycol base)
Manual transmission gear oil	For GT-R: Nissan Mission Oil BNR34 special only Except for GT-R: API GL-4, Viscosity SAE 75W-90
Automatic transmission fluid	Genuine Nissan ATF or equivalent*2
4WD transfer fluid (ATTESA E-TS)	Transfer part: Nissan Matic "D" only Control part: Nissan Power Steering Fluid Special only
Differential gear oil	Front, Rear: API GL-5*1
Power steering fluid	Type Dexron™III or equivalent*2
Brake and clutch fluid	DOT3 (US FMVSS No. 116)
Multi-purpose grease	NLGI No. 2 (Lithium soap base)

*1: For further details, see "SAE Viscosity Number".
*2: For more information regarding suitable fluids, contact a NISSAN dealership for correct brand of DEXRON™IIE or DEXRON™III.

SAE Viscosity Number



TI0002



TI0003

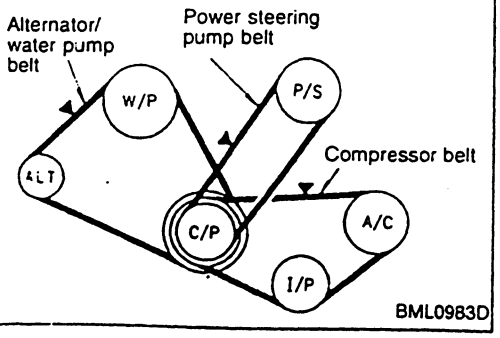
- 10W-30 is preferable for ambient temperature above –20°C (–4°F).
 For turbocharger models, 5W-30 should be used only extremely cold conditions.
- 80W-90 for front, rear differential are preferable.

STANDARD AND REPAIR LIMIT

Firing order			1-5-3-6-2-4
Compression pressure MPa (kg/cm²)/rpm	Standard		1.18 (12.0)/300
	Limit		0.88 (9.0)/300
	Limit of variation between cylinders		0.1 (1.0)/300
Distortion limit mm	Intake manifold		0.1
	Intake manifold collector		0.1
	Exhaust manifold		0.3
	Cylinder head		0.2
	Cylinder block		0.1
Engine oil capacity ℓ	Without filter	Standard vehicles	Approx. 4.2
		N1 spec. vehicles	Approx. 4.5
	With filter	Standard vehicles	Approx. 4.6
		N1 spec. vehicles	Approx. 4.9
Spark plug	Maker/Type/Spark plug gap mm		NGK/PFR6A-11/1.0 - 1.1
Ignition advance device			Electronically-controlled ignition advance
Engine idling speed rpm			950±50
Idle base speed (during no feed back control) rpm			900
Density of CO/HC at idling speed %/ppm			Less than 0.1/Less than 50
Ignition timing (during no feed back control) BTDC°/rpm			20±1/900
Valve clearance (INT/EXH) mm	Cold engine (at ambient temperature)		0.45±0.03/0.38±0.03
	Hot engine		0.51±0.03/0.44±0.03
Fuel tank capacity ℓ			Approx. 65
Engine coolant total capacity [with reservoir tank (max. level)] ℓ			Approx. 9.0
Thermostat opening temperature [start to open - full open] °C			76.5 - 90
Radiator cap opening pressure MPa (kg/cm²)			0.06 - 0.10 (0.6 - 1.0)

		New	Used	Limit
Deflection amount of accessory V-belt Measured with tension gauge N (kg)	Power steering pump belt	667 - 757 (68.1 - 77.1)	555 - 645 (56.7 - 65.7)	289 (29.5)
	A/C compressor belt	667 - 757 (68.1 - 77.1)	555 - 645 (56.7 - 65.7)	289 (29.5)
	Alternator water pump belt	667 - 757 (68.1 - 77.1)	555 - 645 (56.7 - 65.7)	289 (29.5)
Measured by pushing at 98.1 N (10 kg) mm	Power steering pump belt	8 - 10	10 - 12	16
	A/C compressor belt	6 - 8	7 - 9	12
	Alternator water pump belt	3 - 5	4 - 6	7.5

SEC.117



TIGHTENING TORQUE

Unit: N·m (kg-m)

Mass air flow sensor	5.1 - 6.5 (0.52 - 0.66)
Inter cooler	15.7 - 20.6 (1.6 - 2.1)
Inter cooler mount bracket	15.7 - 20.6 (1.6 - 2.1)
Recirculation valve	15.7 - 20.6 (1.6 - 2.1)
Pressure regulator	2.3 - 3.0 (0.23 - 0.31)
Fuel tube & injector assembly	15.7 - 20.6 (1.6 - 2.1)
*Intake manifold collector	15.7 - 20.6 (1.6 - 2.1)
Accelerator operating unit	6.3 - 8.3 (0.64 - 0.85)
IACV-AAC valve assembly	6.3 - 8.3 (0.64 - 0.85)
Throttle sensor	2.0 - 2.4 (0.20 - 0.24)
*Intake manifold	15.7 - 20.6 (1.6 - 2.1)
Air chamber	15.7 - 20.6 (1.6 - 2.1)
Air regulator	6.3 - 8.3 (0.64 - 0.85)
Balance tube	6.3 - 8.3 (0.64 - 0.85)
Water by-pass connector	15.7 - 20.6 (1.6 - 2.1)
Turbocharger	22.6 - 29.4 (2.3 - 3.0)
Exhaust outlet	22.6 - 29.4 (2.3 - 3.0)
*Exhaust manifold	17.7 - 23.5 (1.8 - 2.4)
Exhaust manifold cover	3.7 - 5.0 (0.38 - 0.51)
Oxygen sensor	40.2 - 50.0 (4.1 - 5.1)
Ignition coil	2.3 - 3.0 (0.23 - 0.31)
Ignition coil bracket	12.7 - 15.7 (1.3 - 1.6)
Spark plug	19.6 - 29.4 (2.0 - 3.0)
*Rocker cover	2.0 - 3.9 (0.2 - 0.4)
*Oil pan (M6 bolt)	6.3 - 8.3 (0.64 - 0.85)
(M8 bolt, nut)	31.4 - 42.2 (3.2 - 4.3)
Oil pan drain plug	29.4 - 39.2 (3.0 - 4.0)
Oil strainer (M6 bolt)	6.3 - 8.3 (0.64 - 0.85)
(M8 bolt)	15.7 - 20.6 (1.6 - 2.1)
Camshaft position sensor	15.7 - 20.6 (1.6 - 2.1)
Timing belt cover (upper)	2.9 - 4.9 (0.3 - 0.5)
(lower)	2.9 - 4.9 (0.3 - 0.5)
Crankshaft pulley	446 - 544 (45.5 - 55.5)
Timing belt tensioner pulley	43.1 - 57.9 (4.4 - 5.9)
Idler pulley	43.1 - 57.9 (4.4 - 5.9)
Cam timing pulley	13.7 - 16.6 (1.4 - 1.9)
Camshaft position sensor bracket	20.6 - 26.5 (2.1 - 2.7)
*Camshaft bracket	1) 2.0 (0.2) 2) 5.9 (0.6) 3) 9.0 - 11.8 (0.92 - 1.2)

Unit: N·m (kg-m)

*Cylinder head bolt	1) 29.4 (3.0) 2) 108 (11.0) 3) 0 (0) 4) 24.5 - 34.5 (2.5 - 3.5) 5) 85 - 90° (Angle tightening)
*Main bearing cap	46.1 - 52.0 (4.7 - 5.3)
Baffle plate	15.7 - 20.6 (1.6 - 2.1)
Connecting rod nut	1) 13.7 - 15.7 (1.4 - 1.6) 2) 60 - 65° (Angle tightening)
Rear oil seal retainer	6.3 - 8.3 (0.64 - 0.85)
Flywheel	127 - 137 (13.0 - 14.0)
Knock sensor	15.7 - 20.6 (1.6 - 2.1)
Radiator mounting bracket	3.8 - 4.5 (0.39 - 0.46)
Auxiliary electric fan assembly	3.8 - 4.5 (0.39 - 0.46)
Cooling fan	5.9 - 9.8 (0.6 - 1.0)
Oil pump assembly	9.8 - 11.8 (1.0 - 1.2)
Oil pump cover	3.7 - 5.0 (0.38 - 0.51)
Oil filter bracket	15.7 - 20.6 (1.6 - 2.1)
Water-cooled oil cooler	34.3 - 44.1 (3.5 - 4.5)
Air-cooled oil cooler	6.3 - 8.3 (0.64 - 0.85)
Water pump (M6 bolt)	6.3 - 8.3 (0.64 - 0.85)
(M8 bolt)	15.7 - 20.6 (1.6 - 2.1)
(M10 bolt)	31.4 - 42.2 (3.2 - 4.3)
Water inlet	15.7 - 20.6 (1.6 - 2.1)
Water outlet	15.7 - 20.6 (1.6 - 2.1)
Thermal transmitter	14.7 - 19.6 (1.5 - 2.0)
Water temperature sensor	19.6 - 29.4 (2.0 - 3.0)
Accelerator cable lock nut (throttle drum side)	7.8 - 10.8 (0.8 - 1.1)
Fuel tank strap	26.5 - 36.3 (2.7 - 3.7)
Fuel sender unit	30.4 - 35.3 (3.1 - 3.6)
Exhaust system	
Exhaust outlet to front tube	45.1 - 59.8 (4.6 - 6.1)
Front tube to catalytic converter	43.1 - 54.9 (4.4 - 5.6)
Catalytic converter to sender tube	51.0 - 64.7 (5.2 - 6.6)
*Sender tube to main muffler	30.4 - 39.2 (3.1 - 4.0)
Starter motor	41.2 - 52.0 (4.2 - 5.3)
Starter motor terminal B	12.7 - 15.7 (1.3 - 1.6)
Alernator (upper)	15.7 - 20.6 (1.6 - 2.1)
(lower)	45.1 - 59.8 (4.6 - 6.1)

*: Tighten as specified tightening order.

1) - 5): Tighten separately in several times.

CLUTCH PEDAL

Pedal height	mm	169 - 179
Pedal height at clutch released	mm	More than 81
Pedal free play (clevis pin clearance)	mm	5 - 12 (1.0 - 3.0)

CLUTCH DISC

Size	mm	250 dia.
Wear limit (depth to rivet head)	mm	0.3
Runout limit / diameter at measurement	mm	Less than 0.7 / 240 dia.
Maximum backlash at spline	mm	1.0

CLUTCH COVER

Size	mm	250 dia.
Diaphragm spring lever height	mm	48.2 - 50.2
Variation in diaphragm spring lever height	mm	Less than 0.6

CHECK VALVE

Vacuum leakage [At the vacuum pressure of –26.7 kPa (–200 mmHg)]	Booster side: Within the vacuum pressure of 1.3 kPa (10 mmHg) for 15 seconds Intake manifold side: No vacuum pressure is applied.

CLUTCH BOOSTER

Vacuum leakage [At the vacuum pressure of –66.7 kPa (–500 mmHg)]	Within the vacuum pressure of 3.3 kPa (25 mmHg) for 15 seconds
Push rod installation standard	9.6
Operating rod installation standard	93.5 - 94.5

TIGHTENING TORQUE

Unit: N·m (kg-m)

Clutch cover fixing bolt	35 - 44 (3.5 - 4.5)
Clutch master cylinder fixing bolt	9.9 - 15 (1.0 - 1.6)

TIGHTENING TORQUE

Unit: N·m (kg-m)

Transmission to engine mounting bolt	T/M side to engine side	40 - 49 (4.0 - 5.0)
	Engine side to T/M side	30 - 39 (3.0 - 4.0)

END PLAY

Designation	Standard mm
Clutch hub	0.2 - 0.35
Multiple disc clutch	0.2 - 0.5

CLUTCH HUB BEARING ADJUSTING SHIM

Thickness mm	Parts number	Thickness mm	Parts number
0.40	33112 AA400	0.70	33112 AA403
0.50	33112 AA401	0.80	33112 AA404
0.60	33112 AA402	0.90	33112 AA405

RETAINER PLATE

Thickness mm	Parts number	Thickness mm	Parts number
4.8	31537 1P400	6.0	31537 1P406
5.0	31537 1P401	6.2	31537 1P407
5.2	31537 1P402	6.4	31537 1P408
5.4	31537 1P403	6.6	31537 1P409
5.6	31537 1P404	6.8	31537 1P410
5.8	31537 1P405	7.0	31537 1P411

CLUTCH SPECIFICATIONS

Drive plate	Number of plates	7
	Parts number	31532 05U00
	Thickness mm	2.0
	Wear limit mm	1.8
Driven plate	Number of plates	12
	Parts number	31536 1P400
	Thickness mm	2.0

DRIVE GEAR RUNOUT

Type	Amount of runout at reverse side of drive gear mm
R200H, R200Z	Less than 0.05

ADJUSTMENT OF SIDE GEAR CLEARANCE

Type	Clearance at reverse side of side gear mm
R200Z	0.05 - 0.15

Thrust washer for adjustment of clearance at reverse side of side gear

Type	R200Z	
	Thickness mm	Parts number
Thrust washer	0.75	38424 81X00
	0.80	38424 81X01
	0.85	38424 81X02
	0.90	38424 81X03
	0.95	38424 81X04
	1.00	38424 81X05
	1.05	38424 81X06
	1.10	38424 81X07
	1.15	38424 81X08

ADJUSTMENT OF DRIVE PINION HEIGHT

Adjusting washer for adjustment of drive pinion height

Type	R200 (Strengthened), R200V (Strengthened)							
	Thickness mm	Parts number	Thickness mm	Parts number	Thickness mm	Parts number	Thickness mm	Parts number
Adjusting washer	3.09	38154 P6017	3.24	38154 P6022	3.39	38154 P6027	3.54	38154 P6032
	3.12	38154 P6018	3.27	38154 P6023	3.42	38154 P6028	3.57	38154 P6033
	3.15	38154 P6019	3.30	38154 P6024	3.45	38154 P6029	3.60	38154 P6034
	3.18	38154 P6020	3.33	38154 P6025	3.48	38154 P6030	3.63	38154 P6035
	3.21	38154 P6021	3.36	38154 P6026	3.51	38154 P6031	3.66	38154 P6036

ADJUSTMENT OF DRIVE PINION PRE-LOAD

Type		R200H	R200Z
Drive pinion pre-load	N·m (kg-m)	1.1 - 1.6 (0.11 - 0.17)	1.1 - 1.4 (0.11 - 0.14)

Adjusting washer for adjustment of drive pinion pre-load

Type	R200H, R200Z			
	Thickness mm	Parts number	Thickness mm	Parts number
Adjusting washer	3.81	38125 61001	3.97	38133 61001
	3.83	38126 61001	3.99	38134 61001
	3.85	38127 61001	4.01	38135 61001
	3.87	38128 61001	4.03	38136 61001
	3.89	38129 61001	4.05	38137 61001
	3.91	38130 61001	4.07	38138 61001
	3.93	38131 61001	4.09	38139 61001
	3.95	38132 61001		

Adjusting spacer for adjustment of drive pinion pre-load

Type	R200H, R200Z	
	Thickness mm	Parts number
Adjusting spacer	45.6	38165 10V05
	45.9	38165 10V06
	46.2	38165 10V07
	46.5	38165 10V00
	46.8	38165 10V01

ADJUSTMENT OF SIDE BEARING PRE-LOAD

Type	R200H	R200Z
Side bearing pre-load N·m (kg-m)	0.30 - 1.47 (0.03 - 0.15)	1.45 - 2.04 (0.145 - 0.205)

Adjusting washer for adjustment of side bearing pre-load

Type	R200H		R200Z			
	Thickness mm	Parts number	Thickness mm	Parts number	Thickness mm	Parts number
Adjusting washer	2.00	38453 N3100	1.01	38453 15U00	1.52	38453 15U17
	2.05	38453 N3101	1.04	38453 15U01	1.55	38453 15U18
	2.10	38453 N3102	1.07	38453 15U02	1.58	38453 15U19
	2.15	38453 N3103	1.10	38453 15U03	1.61	38453 15U20
	2.20	38453 N3104	1.13	38453 15U04	1.64	38453 15U21
	2.25	38453 N3105	1.16	38453 15U05	1.67	38453 15U22
	2.30	38453 N3106	1.19	38453 15U06	1.70	38453 15U23
	2.35	38453 N3107	1.22	38453 15U07	1.73	38453 15U24
	2.40	38453 N3108	1.25	38453 15U08	1.76	38453 15U60
	2.45	38453 N3109	1.28	38453 15U09	1.79	38453 15U61
	2.50	38453 N3110	1.31	38453 15U10	1.82	38453 15U62
	2.55	38453 N3111	1.34	38453 15U11	1.85	38453 15U63
	2.60	38453 N3112	1.37	38453 15U12	1.88	38453 15U64
	2.65	38453 N3113	1.40	38453 15U13	1.91	38453 15U65
			1.43	38453 15U14	1.94	38453 15U66
			1.46	38453 15U15	1.97	38453 15U67
			1.49	38453 15U16	2.00	38453 15U68

ADJUSTMENT OF TOTAL PRE-LOAD

Type	R200H	R200Z
Total pre-load with oil seal installed N·m (kg-m)	1.4 - 3.1 (0.14 - 0.32)	1.5 - 2.1 (0.15 - 0.21)
Drive gear backlash mm	0.13 - 0.18	

ADJUSTMENT OF PRESSURE RING CLEARANCE (R200Z)

Pressure ring clearance mm	0 - 0.05

Pressure ring shim

Thickness mm	Parts number	Thickness mm	Parts number	Thickness mm	Parts number
1.27	38414 15U00	1.35	38414 15U02	1.43	38414 15U04
1.31	38414 15U01	1.39	38414 15U03	1.47	38414 15U05

FRONT

Z80T70C

Joint type		Final drive side	T70C
		Wheel side	Z80
Amount of grease g		Final drive side	110 - 120
		Wheel side	75 - 85
Boot length at installed mm		Final drive side	95.5 - 97.5
		Wheel side	90.5 - 92.5
Spider assembly (final drive side)	Stamped number	Parts number	Type
	00	39720 51E00	T70C
	01	39720 51E01	
	02	39720 51E02	
	03	39720 51E03	

Z80T82F

Joint type		Final drive side	T82F
		Wheel side	Z80
Amount of grease g		Final drive side	95 - 105
		Wheel side	75 - 85
Boot length at installed mm		Final drive side	95 - 97
		Wheel side	90.5 - 92.5
Spider assembly (final drive side)	Stamped number	Parts number	Type
	00	39720 10V10	T82F
	01	39720 10V11	
	02	39720 10V12	

REAR

B100D100F

Joint type		Final drive side	D100F
		Wheel side	B100
Amount of grease g		Final drive side	170 - 200
		Wheel side	170 - 190
Boot length at installed mm		Final drive side	103.5
		Wheel side	102

TIGHTENING TORQUE

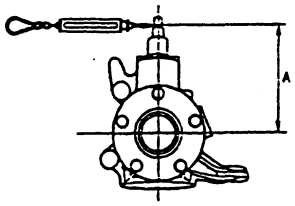
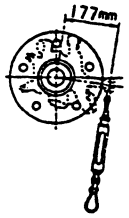
Unit: N·m (kg-m)

Front	Drive shaft to side flange (left side)	28 - 37 (2.8 - 3.8)
	Drive shaft nut	236 - 313 (24.0 - 32.0)
Rear	Drive shaft to side flange	69 - 78 (7.0 - 8.0)
	Drive shaft nut	206 - 274 (21.0 - 28.0)

WHEEL ALIGNMENT

Front	Camber		−0°50′±45′
	Caster		3°55′±45′
	King pin inclination		15°20′±45′
	Toe-in	mm	0 to In 2
	Amount of side slip (Reference)	mm	In 5 to Out 5
Rear	Camber		−1°15′±30′
	Toe-in	mm	0 to In 4
	Amount of side slip (Reference)	mm	In 5 to Out 5

WHEEL BEARING

Location	Front axle	Rear axle
Rotating torque N·m (kg-m)	0.40 - 2.54 (0.04 - 0.26)	0.324 - 1.529 (0.033 - 0.156)
Spring scale measurement N (kg)	2.0 - 13 (0.2 - 1.4)	1.97 - 8.60 (0.20 - 0.88)
Spring scale set position	Length "A" mm: 190  FAC1161D	 RAC0998D
End play mm	0	

BALL JOINT

Oscillating torque	N·m (kg-m)	0.50 - 3.40 (0.05 - 0.35)
Spring scale measurement (at cotter pin hole)	N (kg)	7.95 - 55.3 (0.81 - 5.64)
Sliding torque	N·m (kg-m)	0.50 - 3.40 (0.05 - 0.35)
End play	mm	0

TIGHTENING TORQUE

Unit: N·m (kg-m)

Front	Wheel bearing lock nut		236 - 313 (24.0 - 32.0)
	Arm A to suspension member (Ball joint portion)		96.2 - 119 (9.80 - 12.2)
	Arm A to steering knuckle (Ball joint portion)		96.2 - 119 (9.80 - 12.2)
	Steering knuckle to third link		98.1 - 117 (10.0 - 12.0)
	Third link to upper link		89.0 - 107 (9.00 - 11.0)
	Stabilizer to connecting rod		42 - 47 (4.2 - 4.8)
	Stabilizer connecting rod to mounting bracket		
	Stabilizer clamp fixing bolt		40 - 49 (4.0 - 5.0)
	Stabilizer clamp fixing nut		
	Shock absorber assembly to third link		89.0 - 107 (9.00 - 11.0)
	Shock absorber assembly to underbody		40 - 53 (4.0 - 5.5)
	Shock absorber piston rod lock nut		18 - 23 (1.8 - 2.4)
Rear	Wheel hub lock nut		206 - 274 (21.0 - 28.0)
	Lower arm to suspension member		78.0 - 98.0 (7.90 - 10.0)
	Lower arm to axle housing		79 - 93 (8.0 - 9.5)
	Lower arm connecting rod		8.9 - 11 (0.9 - 1.2)
	Front upper link fixing nut		78.0 - 98.0 (7.90 - 10.0)
	Rear upper link	Bolt	78.0 - 98.0 (7.90 - 10.0)
		Nut	69 - 88 (7.0 - 9.0)
	Connecting rod to stabilizer		8.9 - 11 (0.9 - 1.2)
	Stabilizer clamp		44 - 54 (4.4 - 5.6)
	Shock absorber assembly to axle housing		88.3 - 107 (9.00 - 10.0)
	Shock absorber assembly to underbody		16 - 18 (1.6 - 1.9)
	Shock absorber piston rod lock nut		18 - 23 (1.8 - 2.4)

ROAD WHEEL

Wheel type		Aluminum
Runout limit mm	Lateral	Less than 0.3
	Vertical	Less than 0.3
Permissible amount of residual imbalance g	Dynamic (measured at lug)	Less than 10 (one side)
	Static (measured at lug)	Less than 20

TIGHTENING TORQUE

Unit: N·m (kg-m)

Wheel nut	103 - 122 (10.5 - 12.5)

TIRE

Tire size	Tire air pressure kPa (kg/cm²)	
	Front wheel	Rear wheel
245/40ZR18	230 (2.3)	230 (2.3)
T145/70D17	420 (4.2)	420 (4.2)

BRAKING FORCE

Total braking force of rear wheels	More than 10% of axle weight
Variation between right and left of each wheel	Less than 8% of axle weight
Total braking force	More than 50% of vehicle weight at inspected

Note: The braking force when both front wheels are locked up can be considered to meet the total braking force.

BRAKE PEDAL

Free play (at pedal top surface) mm	3 - 11
Brake pedal height (from top surface of floor panel melt sheet) mm	163 - 173
Depressed pedal height under force of 490 N (50 kg) (from top surface of dash panel melt sheet) mm	More than 75
Clearance between the edge of stop lamp switch screw and pedal stopper mm	0.3 - 1.0

BRAKE BOOSTER

Vacuum leakage [at vacuum of 66.7 kPa (–500 mmHg)]	Within 3.3 kPa (25 mmHg) of vacuum for 15 seconds
Input rod standard length at installed mm	140

FRONT DISC BRAKE

Brake type		OPB27V
Brake pad	Standard thickness (New) mm	11.9
	Wear limit of thickness mm	2.0
Disc rotor	Standard thickness (New) mm	30
	Wear limit of thickness mm	28.4
	Runout limit mm	Less than 0.05

REAR DISC BRAKE

Brake type		OPB13V, OPB13VA
Brake pad	Standard thickness (New) mm	9.6
	Wear limit of thickness mm	2.0
Disc rotor	Standard thickness (New) mm	22
	Wear limit of thickness mm	20
	Runout limit mm	Less than 0.07

PARKING BRAKE

Type		DS17HD
Brake lining	Standard thickness (New) mm	3.0
	Wear limit of thickness mm	1.5
Drum	Standard inner diameter (New) mm	172 dia.
	Wear limit of inner diameter mm	173 dia.
Operating stroke [under force of 196 N (20 kg)]		5 - 7 notches
Maximum stroke		19 notches
Number of notches when brake warning lamp turns on		Within 1 notch

TIGHTENING TORQUE

Unit: N·m (kg-m)

Front caliper mounting bolt	151 - 152 (15.3 - 15.6)
Rear caliper mounting bolt	39 - 50 (3.9 - 5.2)

STEERING WHEEL

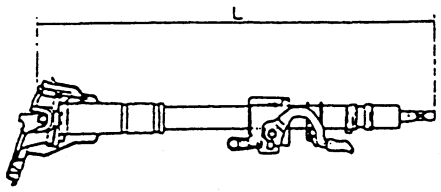
Steering wheel end play	mm	0
Steering wheel free play	mm	0 - 35

STEERING ANGLE

Inner wheel	36°
Outer wheel	30°

STEERING COLUMN

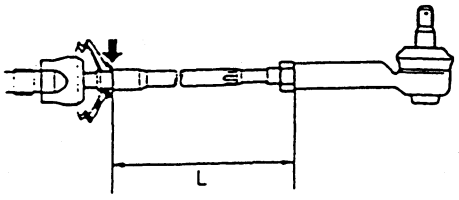
Steering column length "L"	mm	610



STC0720D

STEERING LINKAGE

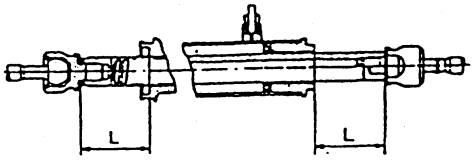
Steering gear type			PR26AF
Tie-rod ball joint outer socket	Oscillating torque	N·m (kg-m)	0.30 - 2.90 (0.04 - 0.29)
	Spring scale measurement (at stud bolt hole)	N (kg)	4.71 - 45.3 (0.48 - 4.64)
	Sliding torque	N·m (kg-m)	0.30 - 2.90 (0.04 - 0.29)
	End play	mm	Less than 0.5
Tie-rod ball joint inner socket	Oscillating torque	N·m (kg-m)	1.0 - 7.8 (0.1 - 0.8)
	Spring scale measurement (at arrow position in figure below)	N (kg)	24.1 - 186 (2.45 - 19.0)
	End play	mm	Less than 0.2
Tie-rod length "L"		mm	151.6



STC0973D

STEERING GEAR

Steering gear type	PR26AF
Rack neutral position "L" mm	62.0



STC0101D

Retainer adjustment	Screw lock nut tightening torque	N·m (kg-m)	40 - 58 (4.0 - 6.0)
	Primary tightening torque	N·m (kg-m)	5.0 - 5.8 (0.5 - 0.6)
	Re-tightening torque after loosening once	N·m (kg-m)	5.0 - 5.8 (0.5 - 0.6)
	Adjusting screw back-off		60° - 80°
Rack sliding force	Range within ±11.5 mm from neutral position (at power ON)	Area mean value N (kg)	166.7 - 225.5 (17.00 - 23.19)
		Range of variations N (kg)	Less than 39 (4.0)
	Full range (at power OFF)	Peak value N (kg)	Less than 294 (30.0)
		Range of variations N (kg)	Less than 147 (15.0)

OIL PUMP

Maximum oil pump relief oil pressure MPa (kg/cm²)	$8.0^{-0.45}_{-0.05}$ ($81.6^{-4.5}_{-0.5}$)

STEERING FLUID

Fluid capacity	ℓ	Approx. 1.0

TIGHTENING TORQUE

Unit: N·m (kg-m)

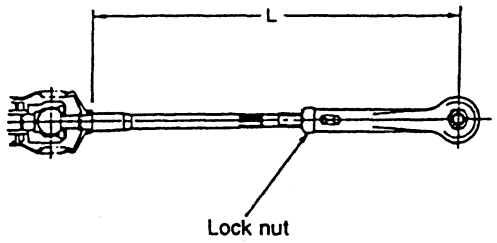
Steering wheel nut		30 - 39 (3.0 - 4.0)
Steering gear to suspension member		Mounting bolt for vehicle LH 62 - 76 (6.3 - 7.8) Mounting bolt for vehicle RH 154 - 163 (15.7 - 16.7)
Steering gear to steering column		24 - 29 (2.4 - 3.0)
Outer socket to steering knuckle		30 - 39 (3.0 - 4.0)
Tie-rod lock nut		79 - 98 (8.0 - 10.0)
Oil pump fixing bolt	Large	32 - 42 (3.2 - 4.3)
	Small	14 - 17 (1.4 - 1.8)
Hydraulic tube (high pressure side) to oil pump		50 - 68 (5.0 - 7.0)
Hydraulic tube to steering gear	High pressure side	15 - 24 (1.5 - 2.5)
	Low pressure side	28 - 39 (2.8 - 4.0)

POWER CYLINDER

Power cylinder ball joint	Oscillating torque N·m (kg-m)	0.98 - 7.80 (0.1 - 0.8)
	End play mm	0

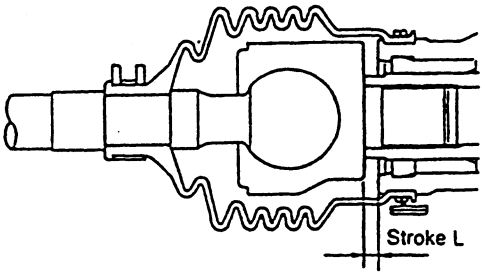
POWER CYLINDER LOWER LINK

Power cylinder lower link length	mm	290.4±1.0



STC0240D

Clearance at power cylinder stroke	mm	3.6±0.1



STC0602D

TIGHTENING TORQUE

Unit: N·m (kg-m)

HICAS actuator assembly fixing bolt	84.4 - 107 (8.60 - 11.0)
Outer link to axle housing	46 - 59 (4.6 - 6.1)